SHARP

OUTSTANDING RECEPTION THE WORLD OVER

SERVICE MANUAL

SD-302U

IMPORTANT NOTICE

PLEASE DO NOT DESTROY THIS BROCHURE.
IT CONTAINS INFORMATION FOR YOUR SERVICE TECHNICIAN SHOULD YOUR SET REQUIRE SERVICE.

MODEL

SD-302U

ELECTRICAL SPECIFICATIONS

GENERAL

Circuit: FM/AM 2-band superheterodyne system stereo receiver with FM multiplex and AGC circuits and with record changer and 2 speaker systems.

Transistors and Diodes:	1-FET, 24-Tr, 1-auxiliary Tr, 19 diode
Power Source:	120V, 60 Hz
Power Consumption:	45 watts
Woofer:	7" P.D.S. x 2
Tweeter:	2" P.D.S. x 2
Dimensions:	(Main unit) 17-3/4"(W) x 9"(H) x 15-1/2"(D) (Speaker box) 9-13/16"(W) x 13-5/8"(H) x 6-3/4"(D)
Weight:	(Main unit) 22 lbs (Speaker box) 5.3 lbs x 2

FM SECTION

Frequency Coverage	88 – 108 MHz
Maximum Sensitivity	3μ V
IF Rejection	60 dB
Image Rejection	40 dB
Harmonic Distortion	1%

FM STEREO SECTION

Stereo Separation	25 dB
Stereo Indicator Lighting Level	30μ V
Harmonic Distortion	1.5%

AM SECTION

Frequency Coverage	530 – 1605 kHz
Usable Sensitivity	300μ V/m
IF Rejection	35 dB
Image Rejection	40 dB
AGC Figure of Merit	45 dB
Harmonic Distortion	1.5%

AUDIO SECTION

Total Peak Music Power	30W
Distortion at 1W	0.2%
Frequency Response	20 Hz ~ 30 kHz
Hum and Noise at Minimum Volume	1.5mV
at Minimum Volume	30mV
Sensitivity for Rated Output Aux	150mV
Recording Output	100mV

PLAYER SECTION

Capacity:	six 7", 10" or 12" disc records may be played automatically
Speeds:	78, 45, 33 and 16 r.p.m.
Cartridge:	Ceramic cartridge.
Wow & Flutter	Wow- - - - below 0.20% r.m.s. Flutter - - - below 0.06% r.m.s. (Gaumont-Kalee meter)

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U.S. Subsidiary of SHARP Corporation, Osaka, Japan

DISASSEMBLY

CHASSIS REMOVAL (Refer to Figure 1 and Figure 2)

1. Disconnect all leads connected to the back of the set.
2. Remove the record changer. (See Figure 2)
3. Remove 9 screws (1) retaining the chassis (2).
4. Gently pull forward the panel (3) and chassis from the cabinet (4).

FRONT PANEL REMOVAL

1. Remove the cabinet as described in Chassis Removal.
2. Remove 6 knobs (5,7,8) from front of the panel.
3. Remove 8 screws (6) retaining the front panel.
4. Gently pull out the panel while holding both sides.

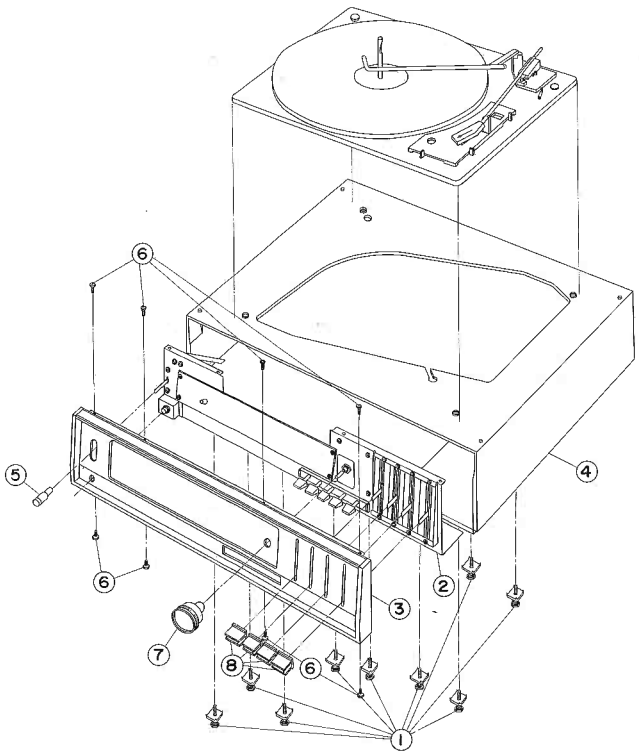


Figure 1

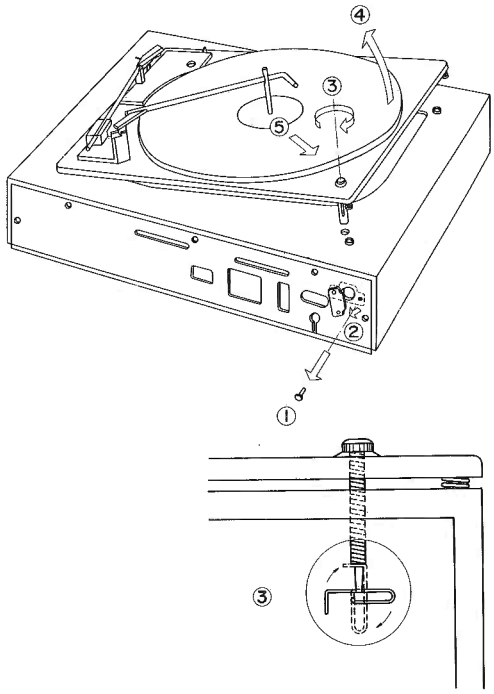


Figure 2

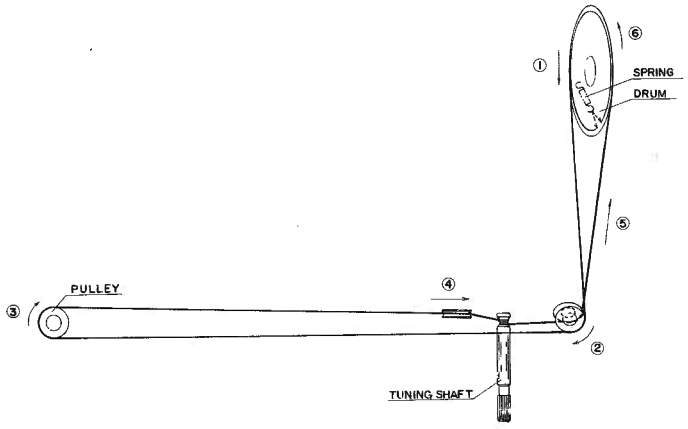


Figure 3 DIAL CORD STRINGING

CIRCUIT DESCRIPTION

SD-302U is an AM/FM/FM MPX tuner-amplifier and with record changer and speaker systems.
The circuit construction is shown in the Block Diagram (Figure 4)

FM FRONT-END SECTION

The signal that is fed from the antenna to the front-end passes through the FM antenna coil (L1a, L1b, L1c) and flows into the gate of the FM RF amplifier (Q1). This FM RF amplifier (Q1) is a high sensitive FET (Field Effect Transistor). The FM converter (Q2) converts the FM RF signal amplified at the FM RF amplifier (Q1) to the FM IF signal. The FM IF signal is transmitted at the first FM IF transformer (T1) and is sent to the next FM IF stages.

AM CONVERTER SECTION

The AM signal is resonated in the primary winding of the ferrite antenna (L501) and the tuning circuit of the variable capacitor, and then its signals step down in the secondary winding of the ferrite antenna (L501). AM converter (Q101) converts the step-down AM signal to AM IF signal and sends it to next AM IF stages.

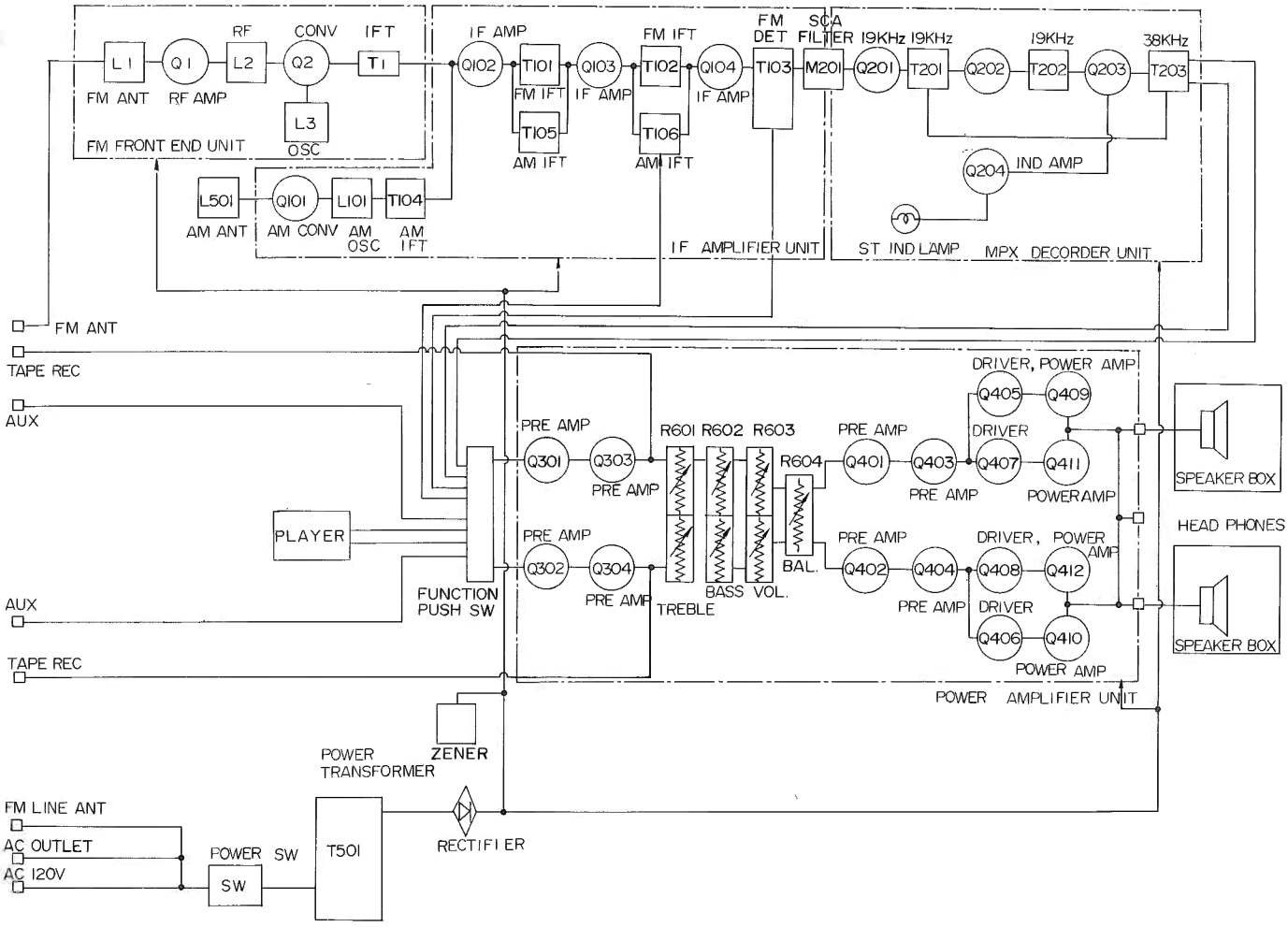


Figure 4 BLOCK DIAGRAM

FM/AM IF AMPLIFIER SECTION

The FM IF circuit incorporates 3 IF amplifiers (Q102, Q103, Q104) and AM IF circuit incorporates 2 IF amplifiers (Q102, Q103).

In FM signal reception, the IF signal is amplified at 1st FM IF amplifier (Q102). The signal that is amplified at 2nd FM IF amplifier (Q103) and 3rd FM IF amplifier (Q104) is detected by the FM discriminator which consists of the transformer (T103) and the diodes (D105, D106) and its signal is converted to the audio frequency signal or the composite signal (in the stereo signal reception). When receiving AM signals, the IF signal amplified at 1st AM IF amplifier (Q102), amplified again at 2nd AM IF amplifier (Q103) and taken out from the secondary side of transformer (T106), is detected at the diode (D102).

The diode (D104, D107) feeds back the DC voltage to the FM RF Amplifier (Q1) gate and operates as AGC.

The diode (D1) operates as the AFC diode. In AM circuit the DC voltage which is obtained from both ends of capacitor (C123) in proportion to input signal, feed back to the bias circuit of the (Q102) through resistor (R108), and to get the AGC effect. The diode (D101) controls large input signals for the AGC diode.

FM STEREO SECTION

FM/FM MPX stereo section consists of the composite signal amplifier stage Q201, 19 kHz pilot signal amplifier stage Q202, sub-carrier amplifier stage Q203 and stereo indicator stage Q204. The output of FM detector is coupled to the base of the transistor Q201 through a high frequency compensation circuit C129, and R134 to compensate roll-off characteristics, and to improve stereo channel separation. If the signal is monaural (L+R), it is amplified by the transistor Q201, which serves two functions: as a 19kHz amplifier when the 19kHz pilot signal is presented and as an ordinary R/C coupled amplifier in coupling the monaural signal with the center tap of the 38 kHz transformer T203.

As coil M201 is tuned to 67kHz, it will have no effect on the monaural signal. Since this 38kHz transformer T203 is not grounded, the signals at the top and bottom will be in phase. Demodulator consists of 4 diodes (D203, D204, D205, D206).

If the signal being trasmitted is a composite stereo signal, it will include a 19kHz pilot signal, the sidebands of the modulated 38kHz suppressed carrier signal (L–R) and a monaural signal (L+R). Transistor Q201 amplifies the composite FM stereo signal. A pilot signal is amplified by the transistor Q201 and coupled to the 19kHz amplifier Q202 through the secondary winding. The composite signal is amplified by the transistor Q201 and extracted from the capacitor C210. The trap coil M201 is tuned to 67kHz which is used as the filter of SCA (Subsidiary Communications Authorization) Signal, such as background music or "Storecast". So it must be trapped out to eliminate any possible interference in the FM stereo reception. Consequently, the (L+R) signal (50Hz–15kHz) and (L–R) signal which is sidebands of a presuppressed 38kHz carrier, and may range from 23kHz to 53kHz depending upon the modulating frequency, are coupled to the center tap of the 38kHz transformer.

The 19kHz pilot signal is thus amplified by the transistors Q201, Q202 and rectified by two diodes D201, D202.

The DC voltage produced by these two diodes D201 and D202 are fed to the base of Q204 which act as a stereo indicator switch.

The 19 kHz pilot signal is thus amplified by the transistors Q201, Q202 and rectified by two diodes D201, D202

The DC voltage produced by these two diodes D202 and D203 are fed to the base of Q204 which act as a Stereo indicator switch.

The 38 kHz component produced by full wave rectified 19 kHz pilot signal is fed to the base of Q203 through high pass filter composed of C207, R206 and R207

And this 38 kHz signal is amplified and fed to the primary of T203.

The 38 kHz transformer T203 is used to reinsert the presuppressed 38 kHz carrier frequency back into the (L–R) signal. The 38 kHz reinserted subcarrier appears 180 degress out of phase at the top and bottom of the secondary winding of T203, when mixed with a composite signal. The right channel modulation appears on the top of the envelope and the left channel on the bottom. The diodes are connected in such a manner that one series pair detects the top envelope and another series pair detects the bottom, depending on the polarity of the 38 kHz signal. Any 38 kHz carrier which has passed through the diodes is filtered out in the paralled T filter networks M202, M203 to exclude tape recording inter-

ference.

In the case of a stereo signal, the output from each demodulator circuit is connected to its respective channel at the audio frequency amplifier stage.

AUDIO SECTION

Audio section consists of 2 pre-amplifiers, tone-control circuit and power amplifier.

The transistor Q301, Q302, Q303, Q304 construct the pre-amplifiers which have rich NF and assure improved frequency response, wide dynamic range and minimum distortion. The output signal of the collector Q303, Q304 are coupled to the tone and volume control circuit.

The output signal of the tone and volume control circuit is then led to the base of the the audio amplifier Q401, (Q402) through the coupling capacitor C401, (C402).

The signal amplified in this stage is fed to the base of the audio driver Q403, (Q404) through the coupling capacitor C403, C404.

The varistors D401 and D402 connected the collector of Q403(Q404) compensate for thermal deviation in the Vbe of Q405(Q406), Q407(Q408), Q409(Q410) and Q411(Q412). The varistor D401 and D402 moreover, supply adequate bias voltage to Q405(Q406) and Q407(Q408). The transistor Q405(Q406), Q407(Q408), Q409(Q410) and Q411(Q412) are connected with "Darlinton Complementary Form". The transistor Q409(Q410) and Q411(Q412) function as the power amplifier. They are located on an efficient heat sink in order to protect them against excessive heat generated at higher volume operation.

Variable resistor R413(R414) is connected in series with the resistor R421(R422). R413(R414) is adjusted so that voltage between the collector of Q411(Q412) and the ground is one half the value of that is measured between the collector of Q409(Q410) and ground. Balanced operation of Q409(Q410) and Q411(Q412) is consequently obtained. The speaker output is taken from the collector of Q411(Q412) through capacitor C415(C416) which negative feedback voltage is fed from the collector of Q411(Q412) through the capacitor C411(C412) and the resistor inproved R438(R439)., frequency response, minimizes distortion and assures stable performance.

POWER SUPPLY SECTION

The power supply section can be divided into three parts: output stage power supply, FM MPX indicator supply and the other power supplies for AM section, FM section, etc.

The diode D403 compose a dual wave rectifying circuit which feeds 29V DC to the power output stages.

The zener diode D404 connected to the rectifier of D403 through R437 through R437 insure a uniform voltage supply and provides a stable 8 V voltage which feeds to AM section FM section and FM MPX section.

ALIGNMENT INSTRUCTIONS

REQUIRED EQUIPMENT

1) Signal generator with a high frequency.
2) Sweep signal generator.
3) Oscilloscope.
4) Stereo signal generator.
5) Vacuum tube voltmeter

Note: Don't use a metallic screw driver.

ADJUSTING METHOD

1) Adjust a signal generator by the weakest signal.
2) Use a weak signal, low output impedance, because the adjustment is misarranged especially when AGC transmits an excessive signal to the receiver.
3) Avoid short-circuiting the terminals.
4) Set a volume control at maximum.
5) Set a tone control at a desirable position.
6) Ensure that the modulation of the signal generator is 30%.

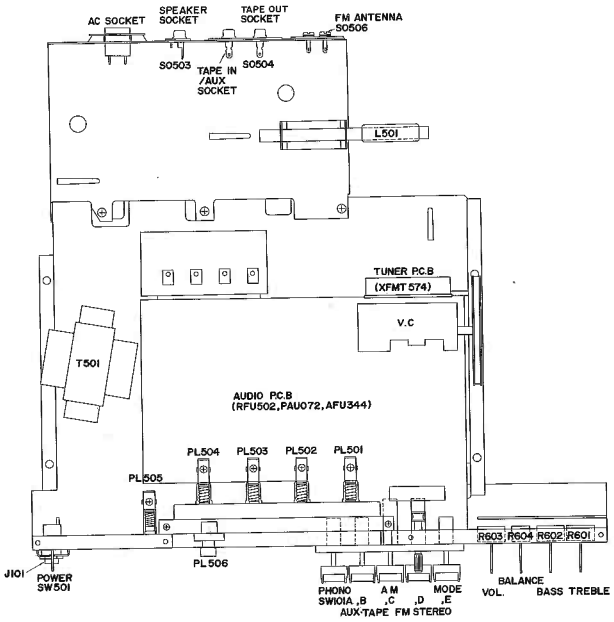


Figure 5 CHASSIS ALIGNMENT LAYOUT

ALIGNMENT PROCEDURE

AM ALIGNMENT

PROCEDURE NUMBER	Signal Generator		Dial Pointer Setting	Function Setting	Meter Connection	Adjustment	Remarks
	Connection	Frequency					
1	Thru 0.01 mfd to Q101 Base as small as possible	455kHz Modulated	High end of Dial	AM	Across Output Load	T104 T105 T106	Volume control max. Get peak output point. Repeat 2 or 3 times.
2	Radiated Signal as small as possible	1650 kHz Modulated	High end of Dial	AM	Across Output Load	Oscillator Trimmer TC5	Same as above
3	Radiated Signal as small as possible	515 kHz Modulated	Low end of Dial	AM	Across Output Load	L101	Same as above
4	Radiated Signal as small as possible	1400kHz Modulated	1400kHz	AM	Across Output Load	Tuning Trimmer TC4	Same as above
5	Radiated Signal as small as possible	600kHz Modulated	600kHz	AM	Across Output Load	4L-138A L501	Same as above
6	If necessary, repeat step 2-step 5.						

FM IF ALIGNMENT

PROCEDURE NUMBER	Sweep Generator		Dial Pointer Setting	Function Setting	Scope Connection	Adjustment	Remarks
	Connection	Frequency					
1	Detune Tl completely						
2	Thru 0.01mfd to Q102 Base	10.7MHz	High end of Dial	FM	TP102	T101, T102	Set curve at maximum as shown in the Figure 6. Repeat 2 or 3 times.
3	FM-ANT	10.7MHz	High end of Dial	FM	TP102	Tl	Same as above.
4	FM-ANT	10.7MHz	High end of Dial	FM	TP103	T 103	Adjust "S" curve at maximum. Adjust 10.7MHz at the center of "S" curve.
5	Repeat adjustments to obtain"S" curve as shown in Figure 7						

PRECAUTIONS ON DETUNING

Turn the core of T103 two or more times. Then pull the core out. In the case of Tl, pull the core out of the spiral core.

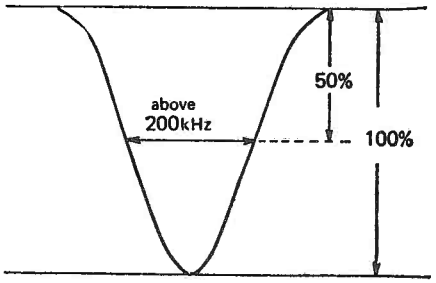


Figure 6

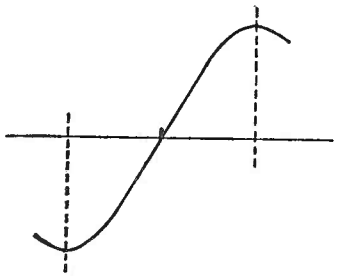


Figure 7

FM RF ALIGNMENT

PROCEDURE NUMBER	Signal Generator		Dial Pointer Setting	Function Setting	Meter Connection	Adjustment	Remarks
	Connection	Frequency					
1	FM-ANT Terminal (through 300ohm matching pad)	108.5 MHz Modulated	High end of Dial	FM	Across Output Load	Oscillator Trimmer TC3	Volume Control max. Get peak output point.
2	FM-ANT Terminal (through 300ohm matching pad)	86.5 MHz Modulated	Low end of Dial	FM	Across Output Load	L3	Volume Control max. Get peak output point.
3	FM-ANT Terminal (through 300ohm matching pad)	106MHz Modulated	106MHz	FM	Across Output Load	Tuning Trimmer TC1, TC2	Volume Control max. Get peak output.
4	FM-ANT Terminal (through 300ohm matching pad)	90MHz Modulated	90MHz	FM	Across Output Load	L1(c) L2(a,b)	Volume Control max. Get peak output.
5	If necessary, repeat step 1-step 4.						

FM STEREO ALIGNMENT

PROCEDURE NUMBER	Stereo Signal Generator		Tuning Frequency	Function Setting	Scope Connection	Adjustment	Remarks
	Connection	Mod. Frequency					
1	FM-ANT	19kHz Mod. level as small as possible	98MHz	FM stereo	TP201	T201, T202	Get the maximum point. Repeat 1 or 2 times.
2	FM-ANT	19kHz 10% Mod.	98MHz	FM stereo	TP-202	T203	Get the maximum point.
3	FM-ANT	1000Hz Ch. L only	98MHz	FM stereo	Across Ch. L Output Load	T202	Get the maximum output point. Counter-clockwise 1/16-1/8 turn.

Note: Output level of FM Signal Generator which is modulated by a FM Stereo Signal Generator shall be 1mV.

TRANSISTOR NAME AND FORM

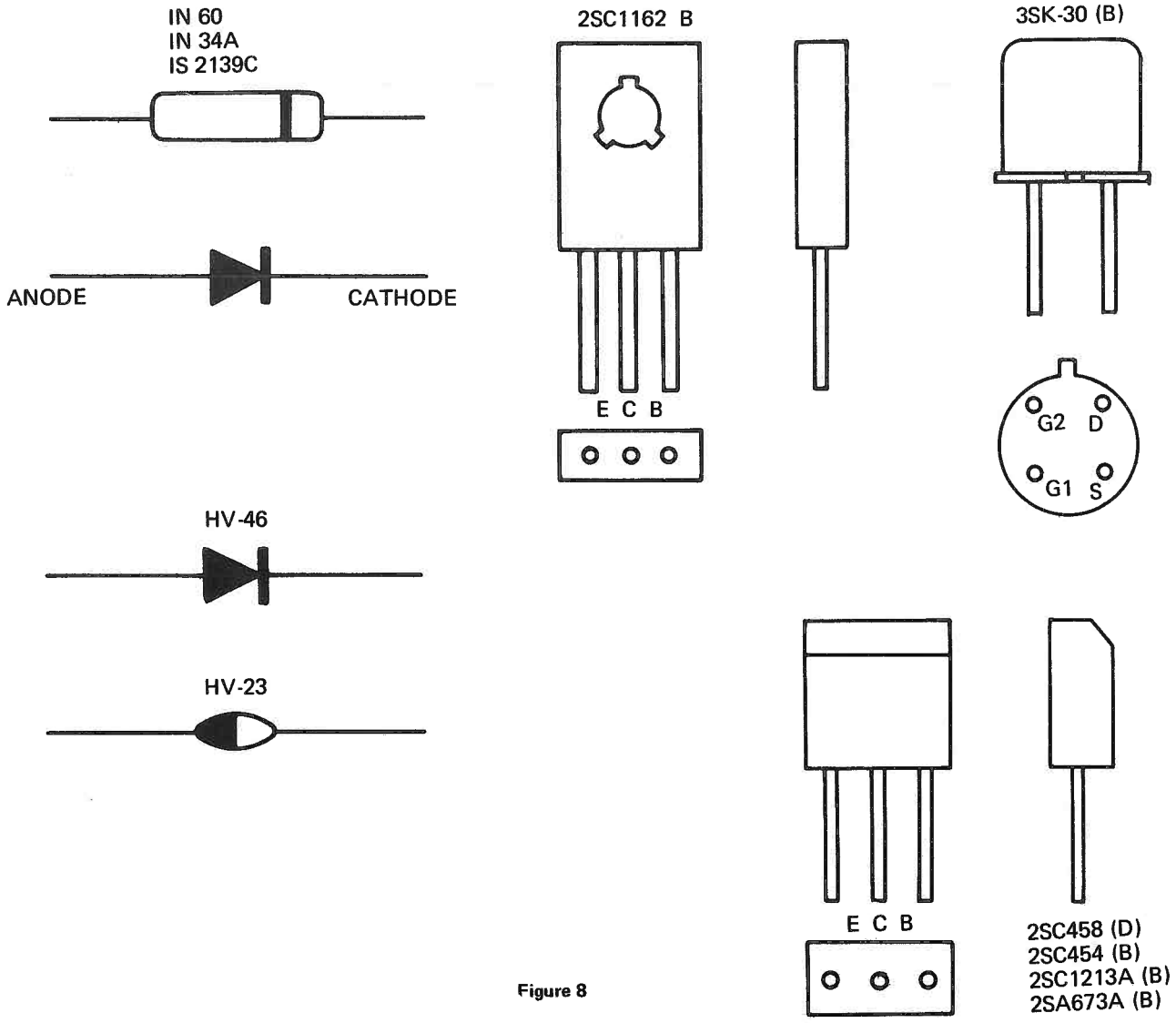


Figure 8

OPERATING INSTRUCTION

Automatic Play

Grasp control arm (3) at the rear, raise it to its highest position and swing counterclockwise until it is positioned over the tone arm in the tone arm rest (36). Place a maximum of six records (all the same size and speed) on spindle (2). The first record to be played must be located carefully on the ledge of spindle (2) and held in place until the rest of the records are placed on spindle (2). Return control arm (3) to its center position and lower it onto the stack of records. Move the size selector knob to the 12, 10 or 7 position for the 12", 10"or 7" records to be played. Move the speed selector knob to the 16, 33, 45, or 78 position for the 16, 33-1/3, 45, or 78 rpm records to be played.

If the cartridge is equipped with more than one stylus, be sure the correct stylus is positioned for the records to be played.

If 45 rpm (large center hole) records without center hole adaptors are to be played, slip the 45 rpm adaptor spindle over automatic spindle (3). The arrow on the top of the 45 rpm adaptor spindle must point toward the front left corner of the changer.

Starting

Be sure the tone arm is free and resting on the tone arm rest (36). Move the control knob to the Auto position and hold until the turntable starts to revolve, then release.

Rejecting

To reject a record at any time while the changer is in operation, move the control knob to the Auto position and then release. If the record being played was not the last one in the stack, the next record will be dropped and played. If the record being played was the last record in the stack, the tone arm will move to the tone arm rest and the changer will shut off.

Stopping

The changer can be stopped at any time by moving the control knob to the Stop position. If the changer is stopped during the "change cycle," it must be allowed to complete the cycle (by manual rotation of the turntable, if necessary) before moving the tone arm and removing the records. During normal automatic operation, with the control arm in the center position, the changer will stop automatically after the last record has been played.

Unloading

To unload the changer, raise the control arm to its highest position and swing it into position over the tone arm rest (36). Using both hands, grasp the bottom record and gently lift the record stack straight up and off the spindle.

After unloading a stack of 45 rpm records, with large center holes, make certain the 45 rpm adaptor spindle is properly seated before playing additional 45 rpm records.

Semi-Automatic Play

For semi-automatic play and repeat of a single record, lift the control arm, move it to its position over the tone arm and leave it there. Place the record on the turntable and set the controls for correct record size and speed. Select correct stylus.

To start, move the control knob to the Auto position and release, allowing the knob to move back to the Start position. The turntable will revolve, the first (bottom) record will drop to the turntable and the tone arm will place the stylus in the starting groove to play the record.

If the control arm is returned to the center position over the turntable, after the stylus is in the starting groove, the tone arm will be returned to the tone arm rest and the changer will shut off automatically at the end of the record.

NOTE: Records that do not have the "starting" or "fast-finishing" grooves must be played manually.

Manual Play

To manually play a record, move the control arm to its position over the tone arm rest. With the correct speed and stylus selected, the record is placed on the turntable and the control arm moved to the center position.

The control knob is moved to the Start position to start the turntable.

Using the finger lift, raise the tone arm from the rest and move it to the playing position on the record.

At the end of the record, the tone arm will return to the tone arm rest and the changer will shut off automatically.

Cueing Lever

Raising or lowering the cueing lever (41) raises or lowers the tone arm, under positive control, from any point on or off the record. Lift the cueing lever and the tone arm is lifted into position where it can be moved manually to any position over the record and then lowered gently to the selected groove by lowering the cueing lever.

To pause while playing, raise the cueing lever to lift the stylus from the record for the desired length of time and lower the cueing lever to return the stylus to the same record groove.

The cueing lever must be in the lowered position during automatic operation of the changer.

CHANGE CYCLE

General Information

The change cycle is started by moving the control knob to the Auto position, then releasing it. The tone arm lifts and a record is dropped to the turntable. The tone arm moves toward the spindle, stops at the point determined by the setting of the 12, 10, 7 knob, where it is lowered to the lead-in groove of the record.

When the needle reaches the end of the recorded grooves and enters the fast-finish groove at the end of the record, the tone arm movement toward the spindle accelerates rapidly to actuate the velocity trip mechanism. The tone arm is lifted and returned to a position over the tone arm rest, and the bottom record on the spindle drops into playing position on the turntable. The tone arm returns to the starting point of the record and is lowered to the lead-in groove.

The previously described action takes place each time the end of a record is reached until the last record has played. At this time, the velocity trip mechanism starts another change cycle and the tone arm returns to its position over the tone arm rest. The tone arm is then lowered to the tone arm rest and automatic shutoff occurs.

NOTE: The following is a description of the functions that the various parts perform during a change cycle. Observe the change cycle operation while slowly rotating the turntable by hand. The following description can then be readily followed and the function of each part more easily understood.

Speed Change Mechanism

The model C141 is driven by a 2-pole motor (131) or 4-pole motor (164) through the 4-step pulley shaft. Power is transmitted to turntable (153) by the idler pulley (125) pressing against the driving rim of turntable (153) and against one of the four steps of the motor pulley.

When the speed selector knob is moved to the 78 position, idler pulley (125) is positioned to engage the largest diameter step on motor pulley. As the speed control knob is moved to the 45, 33 and 16 positions, idler pulley (125) is progressively positioned to engage smaller diameter steps on the motor pulley for slower speeds.

Starting the Change Cycle

When the control knob (50) is pushed toward the Auto position, reject slide (71) moves reject plate assembly (73) causing switch link (64) to activate switch lever (67). In turn, switch lever (67) depresses the switch plunger to close off-on switch assembly (129). This impresses the necessary voltage on the mechanism drive motor. At the same time, switch lever (67) pivots away from idler arm (127) to allow jockey pulley spring (126) to move idler wheel (125) against the inside rim of the turntable and against the motor shaft. This action starts the turntable rotating in a clockwise direction.

When the control knob (50) is moved from the Stop position toward the Auto position, the angled tip of reject lever assembly (78) contacts actuating slide spring (110) causing actuating slide (97) to move toward the turntable shaft. Actuating slide (97) contacts and pivots actuating pawl (120) into the path of the projection on the turntable boss and gear.

Since the turntable is rotating clockwise, the projection on the turntable boss and gear strikes actuating pawl (120) to move cam gear (119) far enough to mesh with the teeth on the turntable gear. This action starts cam gear (119) rotating in a counterclockwise direction to initiate the change cycle.

Tone Arm Action and Record Drop

The stud and roller on operating plate (100) follows the eccentric groove in the bottom of the cam gear (119). The resulting pivoting action of operating plate (100) controls the vertical and horizontal movements of the tone arm.

As operating plate (100) pivots, tone arm raising spindle (94) rides up the inclined portion of operating plate (100) to lift the tone arm from the tone arm rest (36). As operating plate (100) continues to pivot, feed lever link (103) retracts the feed lever in automatic spindle (2) to slide the bottom record off the spindle (2) ledge so the record will drop to the turntable (153).

The tone arm set-down point is determined by the position of the 12, 10, 7 knob. When the 12, 10, 7 knob is moved to the desired position, selector slide (72) moves detent plate (74) to hold the cut-off slide (118) in position to stop the selector lever (84) at the correct position to fit into the notch of quadrant (90) for tone arm set-down for the record size selected.

As operating plate (100) continues to pivot during the change cycle the spring A fitted to operating plate (100) engages with toggle wheel (96), causing the quadrant to move in the opposite direction operating plate (100) is pivoting. The movement of the quadrant is stopped by the selector lever (84) at the point determined by the size selector knob. Since tone arm hinge (33) is mounted on the spindle of quadrant (90) the tone arm is now positioned at the set-down point for the record size selected. After the set-down point is reached toggle wheel (96) slips off spring A on operating plate (100). Operating plate (100) continues to cycle, reversing direction allowing the tone arm raising spindle (94) to ride down the inclined portion of the operating plate (100) lowering the tone arm to the record surface.

After the tone arm is in place on the record, operating plate (100) continues to move, pushing the selector lever clear of quadrant (90). This allows quadrant (90) and the tone arm to move freely as the stylus follows the record grooves. The operating plate (100) now stops since the cam gear (119), which drives it, has made a complete revolution and, being no longer meshed with the turntable gear has stopped.

Velocity Trip

After a record has been played, a velocity type trip mechanism initiates a new change cycle. This is due to the accelerated inward movement of the tone arm as the stylus enters the trip groove at the end of the record.

While the record is playing, the tone arm moves slowly toward the spindle (2). Actuating slide (97) is moved by the pin on quadrant (90), to make contact with actuating pawl (120). As the record continues to play, actuating slide (97) moves the actuating pawl (120) toward the turntable (153) hub and gear. On each revolution of turntable (153), the projection on turntable (153) hub pushes actuating pawl (120) out of the way to prevent a premature change cycle. This is possible because of the slow movement of the tone arm while the record is playing. When the stylus enters the record lead-out groove, the tone arm accelerates rapidly and actuating pawl (120) is moved far enough to cause engagement with the projection on the turntable (153) hub. The contact between actuating pawl (120) and turntable (153) hub projection gives the necessary push for the teeth in cam gear (119) to mesh with the teeth on the turntable (153) gear and initiate a change cycle.

Automatic Shut-Off

When the last record drops to turntable (153), contorl arm (3) drops below the ledge of automatic spindle (2). The spindle of the control arm contacts cut-off slide (118) and pivots cut-off slide (118) down away from selector lever (84) during the next change cycle. At the end of the last record, the changer goes into a change cycle and the tone arm is lifted from the record and moved to its position over tone arm rest (36). As operating plate (100) moves and the tone arm reaches the position over rest (36), since the selector lever is not stopped by cut-off slide (118), spring (101) pushes the selector lever (84) into the position where, as operating plate (100) changes direction, it blocks quadrant (90) and holds the tone arm in the rest position during the remainder of the change cycle. Operating plate (100) continues to move in this direction until cam gear (119) is unmeshed from the gear on turntable (150). Before it stops, the moving operating plate (100) lowers the tone arm to rest (36) and the released selector lever is pushed against cut-off lever (82). Cut-off lever (82) moves reject lever (78) and reject link (79) to turn reject plate (73). When reject plate (73) turns, switch link (64) pushes on switch lever (67) to open switch (129) and moves speed change arm to retract idler pulley (125) from turntable (150) driving rim and motor pulley. Reject plate (73) being connected to control knob (50) by means of reject slide (71) moves control knob (50) to the Stop position.

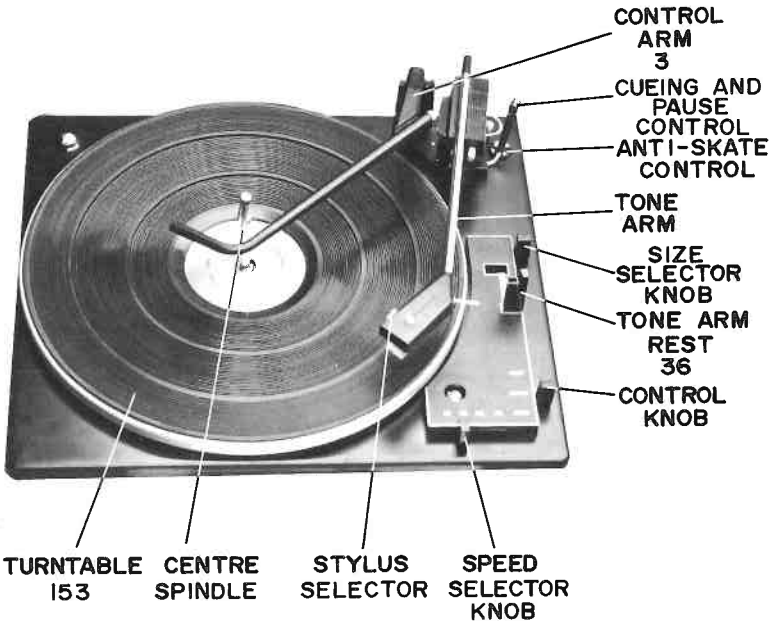


Figure 9

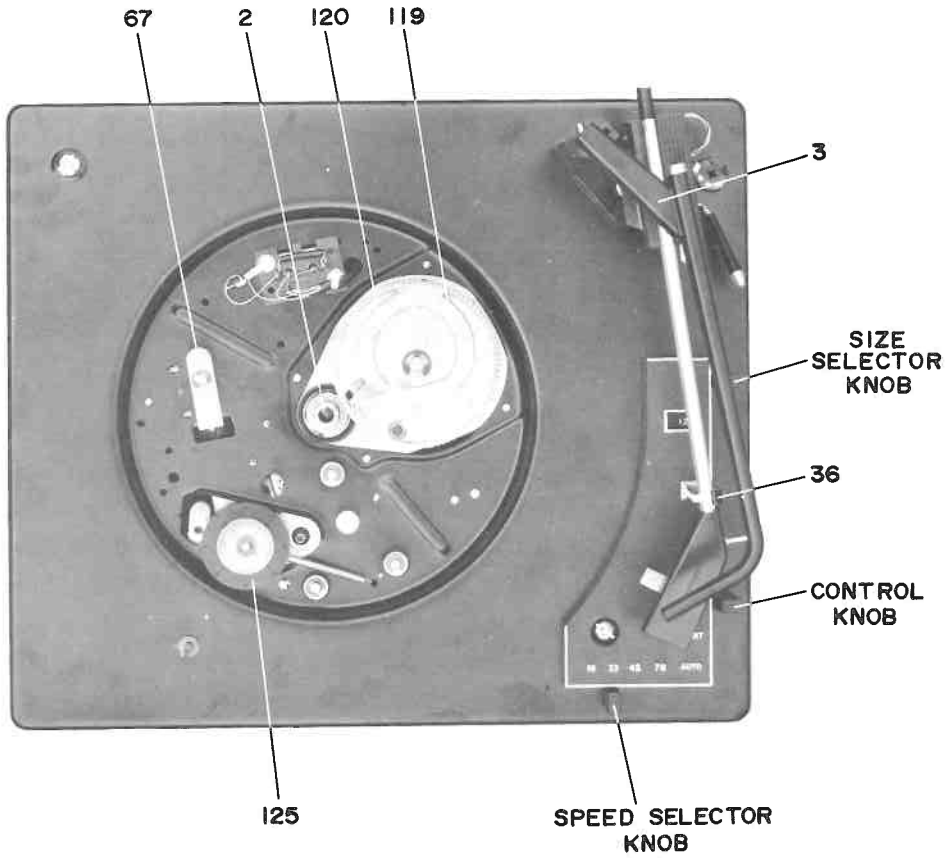


Figure 10

ASSEMBLY SERVICE INFORMATION

Standard Automatic Spindle

To remove standard automatic spindle (2) pull spindle (2) straight up, turn clockwise to release from retaining spring (89) and lift out of the center hole in turntable (153).

To install standard automatic spindle (2), insert spindle (2) into the center hole of turntable (153). Rotate spindle (2) until the projecting lug on the side of spindle (2) enters the slot in the turntable bearing and is locked in position by retaining spring (89).

Turntable Assembly

Remove center disc (156) from turntable (153). Move control knob to Stop. Remove circlip (114) and lift turntable (153) off changer. When replacing turntable (153) make certain the control knob is in the Stop position so that idler pulley (125) is not damaged by the driving rim of turntable (153).

Tone Arm Assembly

To remove the complete tone arm assembly, first unsolder cable (8) leads at tag mounting strip (143) or phono socket (121) and release cable (8) from all fastenings. Unhook stylus pressure spring (27) from hook on tone arm hinge (33). Remove tone arm pivot screw (7) to release tone arm from hinge (33). Tone arm may now be removed.

Control Arm Assembly

To remove control arm (3) remove circlip (70) spacer (112) and control arm spindle spring (113). Pull control arm (3) up and out of control housing (40).

ADJUSTMENTS

This changer has been accurately pre-adjusted for correct stylus set-down, stylus pressure and tone arm height. If new adjustments should ever be needed, make them with a 12" record; then position will be correct for all sizes.

Idler Pulley

Disconnect changer from AC source and remove turntable (153). Set speed selector knob on 33 and control knob to Start so idler pulley (125) rests against the 33 rpm step on the motor pulley (131). Using a screwdriver, turn adjustment screw (128) until idler pulley (125) is centered on the 33 rpm step of motor pulley. Check the alignment of idler pulley (125) at all speeds and readjust if necessary. Move the control knob to Stop and replace turntable (153) taking care not to damage idler pulley (125).

Tone Arm Height

To raise, hold plastic nut (38) firmly and turn screw head (35) by hand counterclockwise; to lower, turn screw head (35) clockwise. Adjust stylus to clear a full stack of records by 1/8".

Stylus Set-Down

The set-down position of the stylus on the record is adjusted by means of the stylus adjusting screw (25). This screw is adjusted to obtain correct set-down for a 12" record. It should be adjusted so the stylus will set down 1/8" from the outside edge of the record. This adjustment should be made with a 12" record on the turntable. When the stylus set-down is adjusted correctly for 12" record, it will automatically be correct for 7" and 10" records.

Stylus Pressure

NOTE: It is necessary to use a stylus pressure gauge in adjusting the stylus pressure of the tone arm. One can be obtained from a local hi-fi store. The stylus pressure indicator on the side of the tone arm is for reference only and indicates an increase or decrease in the nominal stylus pressure setting.

Turn stylus pressure adjusting screw (9) clockwise to reduce stylus pressure; counterclockwise to increase pressure.

Anti-Skate

This control has three positions: 2, 4, and 6 grams. Set this control to the number that is closest to the stylus pressure setting. This anti-skate feature prevents the tone arm from making quick lateral movements, such as skating through the "lead-in" grooves of a record.

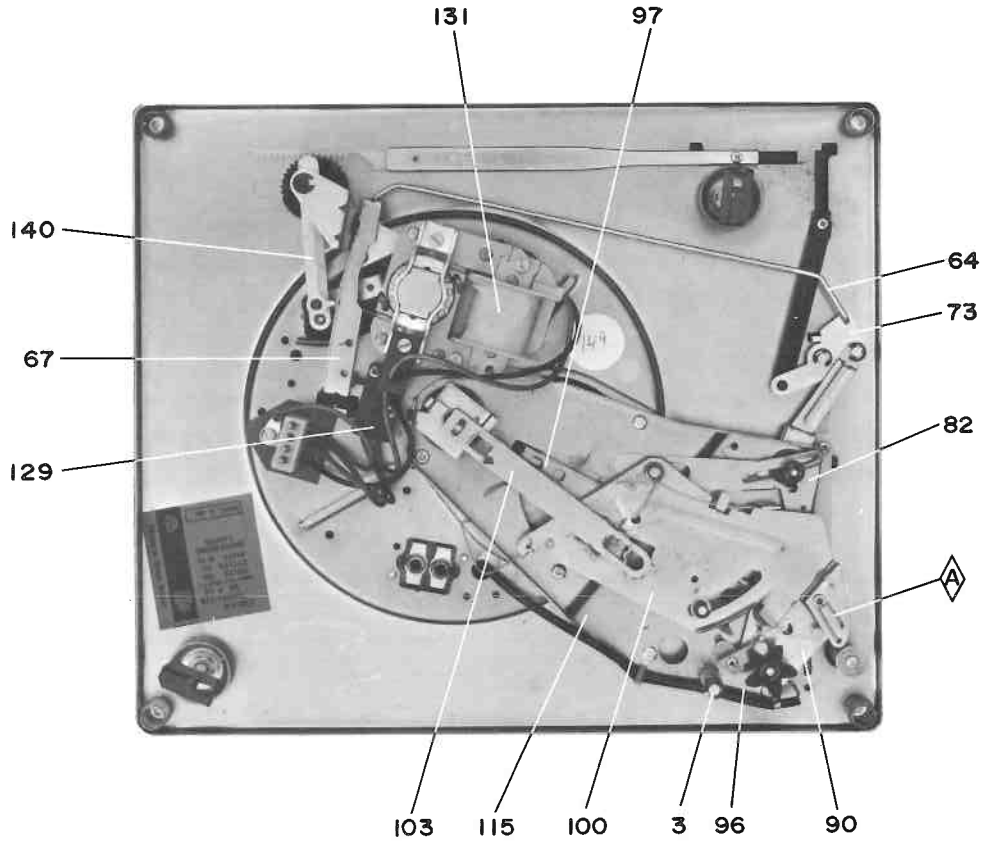


Figure 11

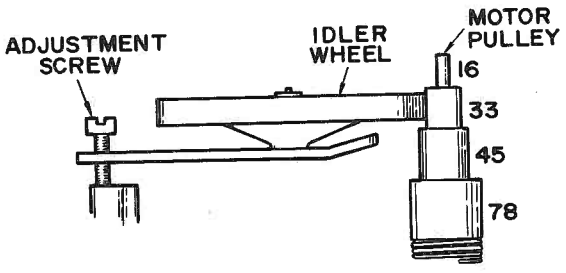


Figure 12

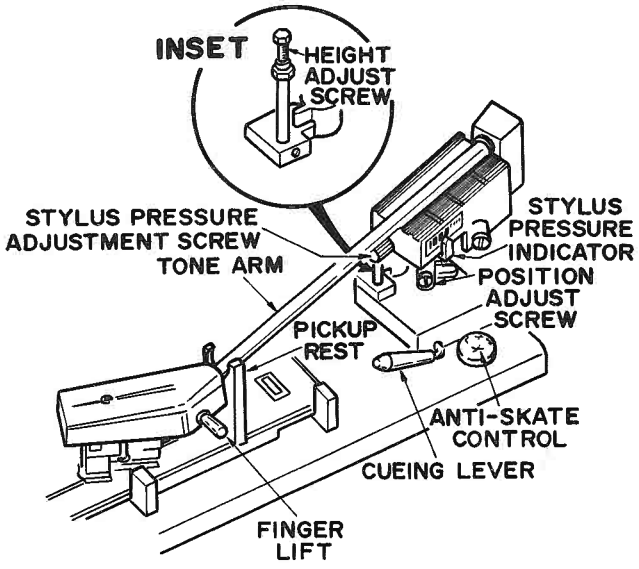


Figure 13

LUBRICATION

The mechanism has been thoroughly lubricated at the factory and under normal use should not require additional lubrication for at least one year. However, after prolonged use; it may be necessary to lubricate parts as specified.

Use a medium grade grease only on these parts:

1. Speed change arm (140)
2. Idler pulley arm (127)
3. Bearing surfaces of operating plate (100)
4. Gear teeth, bearing and cam track on cam gear (119)
5. Ball race (149)

Use a light machine oil on these parts:

1. Tone arm raising spindle (94)
2. Idler pulley spindle on pulley arm (127)
3. Upper and lower bearings of motor (131)

NOTE: Oil or grease should never be applied to or allowed to collect on the rubber tire of the idler pulley (125), the inside surface of the driving rim of turntable (153) or on the motor pulley.

TROUBLE CHART

Symptom	Cause	Remedy
Turntable does not revolve when the control knob is moved to the Auto position.	1. No current to motor (131).	1. Make sure that current is reaching the AC leads, Check switch (129) and AMP lock (133). Replace if necessary.
	2. Defective motor (131).	2. Remove turntable (153) and check motor (131). Repair or replace motor (131).
	3. Idler pulley (125) not engaging driving rim of turntable (153).	3. Connect or replace spring (126). Check that idler arm (127) pivots freely.
	4. Idler pulley (125) not driving.	4. Clean idler pulley (125) and driving rim of turntable (153) to ensure that driving surfaces are free from oil and dirt.
Turntable (153) revolves when the control knob is moved to the Auto position but the tone arm does not leave rest (36).	1. Tone arm not adjusted for correct height.	1. Adjust screw (35) as described under "Adjustments."
	2. Spring of actuating slide (97) bent or missing.	2. Adjust or replace.
Turntable stops or slows down in middle of change cycle.	1. Idler pulley (125) slips.	1. Clean inside of driving rim of turntable (153) and rubber tire of idler pulley (125) to remove any oil or dirt.
	2. Insufficient tention on idler pulley spring (126).	2. Check tension of spring (126) and replace if necessary.
Turntable speed too slow.	1. Tight motor (131) bearings.	1. Lightly tap side of motor (131) laminations to free self-aligning bearings. Lubricate bearings.
	2. Binding turntable bearing (153)	2. If turntable (153) does not turn freely when idler pulley (125) is disengaged, remove turntable bearing. Lubricate bearing with light machine oil.
	3. Idler pulley (125) slips.	3. Idler arm (127) must pivot freely in speed change arm (140). Check tension of spring (126). Replace spring (126) if necessary.

Symptom	Cause	Remedy
	4. AC line voltage too low.	4. Line voltage should not be less than 100V.
	5. Operating temperature too low.	5. Prolonged exposure to temperature below 45 degrees F will cause slow initial speed.
	6. Idler pulley height incorrect.	6. Adjust as outlined under "Adjustments."
Record fails to drop when changer cycles.	1. Spindle (2) not fully inserted in center of turntable (153).	1. Make certain spindle (2) is fully engaged and locked in place.
	2. Bent record feed lever in spindle (2).	2. Replace spindle (2).
	3. Spring (104) missing or detached from feed lever link (103).	3. Replace or reposition.
	4. Spring (105) missing from feed lever link (103).	4. Replace.
Tone arm strikes under side of record on ledge of spindle (3), or stylus catches on top of last record while moving into playing position.	1. Incorrect tone arm height Adjustment.	1. Adjust screw (35) as described under "Adjustments."
Tone arm does not correctly locate on record.	1. Tone arm set-down not adjusted correctly.	1. Adjust screw (25) as described under "Adjustments."
Tone arm does not track corectly across record.	1. Stylus may be clogged with an accumulation of dust, or stylus may be chipped or worn.	1. Clean foreign material from around stylus. Replace stylus if badly worn or broken.
	2. Pick-up leads too tight.	2. Give Pick-up leads enough slack to allow tone arm to move freely across record.
	3. Changer not level.	3. See that changer is level before operating.
	4. Insufficient stylus pressure.	4. Adjust stylus pressure as described under "Adjustments."
	5. Record with worn or damaged grooves.	5. Replace record.
	Lateral friction caused by:	
	6. Excessive tension on support spring (93).	6. Bend support spring out slightly to release tension.
	7. Excessive anti-skate compensation.	7. Reduce anti-skate setting.
	8. Weak support spring (93).	8. Bend support spring inwards.
	9. Actuating pawl assembly sticking.	9. Release or replace actuating pawl (120).
Unit will not re-cycle at end of record.	1. Tripping pawls assembly (120) binding.	1. Check for friction and free movement.

Symptom	Cause	Remedy
	2. Needle set-down inside music groove.	2. Adjust needle to set down at center of lead-in groove.
Two records drop together.	1. Hole in record too large.	1. Replace record.
	2. Control arm (3) not fully down possibly due to incorrectly loaded records.	2. Carefully clean shaft of control arm (3) and remove burrs, if any. Do not oil shaft. Control arm (3) should fall in position of its own weight.
	3. Control arm (3) not holding records level.	3. Gently twist control arm (3) until it will hold record stack parallel to the top surface of turntable (153).
Changer fails to shut off after last record has played and tone arm has returned to rest	1. Switch (129) fouled by AC leads.	1. Move leads clear of switch (129).
	2. Faulty switch (129).	2. Replace switch (129).
Noise during playing of record.	1. Motor rumble.	1. Motor (131) must float freely on mounting grommets (130). Replace grommets (130) if necessary. Motor leads must be positioned to allow free movement of motor (131).
	2. Turntable (153) bearings and ball race (149).	2. Clean and lubricate bearings. Replace ball race (149) if necessary. Use light machine oil on bearing of turntable (153) and medium grade grease on ball race (149).
	3. Defective idler pulley (125).	3. Replace idler pulley (125).

TROUBLESHOOTING

PROCEDURE

1. Set the tester to a resistor range. Put the tester probe on the power plug and switch on and off to check the switch and snap of transformers.
2. Insert the power plug to switch on and check the voltage respectively. As for the voltage of main parts, refer to the schematic diagram.
3. Change the push switches to PHONO-TAPE/AUX-AM-FM-MONO/STEREO. Check that the set correctly operates in each position by listening to the speakers of left and right channels.

A) Defective operation in Phono position
   1) Switch power off and check that the lead of the speaker is properly connected.
   2) Switch power on and set the volume for maximum. When touching the opposite sides of the ground of the left and right volume with a finger, hum is obtained. When no hum is obtained on both channels, check the operating voltage. When sound is obtained on single channel only, check as follows:
      a) In order to check hum or audio signal with the crystal receiver, it should be connected to the Base Q401 through the capacitor of 0.01MF. When no sound is obtained, the operations of D401, in the output stage are defective.
      b) Defective transistors can be found by checking the emitter voltage.
      c) When sound is obtained on both channels, the ceramic cartridge will be defective.

B) Defective operation at AM stage
   1) Check the emitter voltages (Q101, Q102, Q103,) and the +B Voltage.
   2) Transmit an AM modulated 455 kHz signal with a test oscillator to the base of Q101, Q102, Q103 respectively through the capacitor of 0.01 MF. Then check at which stage sound is obtained. Check the coils and the condensers on the side of the collector or the base at the stage at which no sound is obtained.
   3) Transmit an AM modulated 1 MHz signal with a test oscillator to antenna coil by radiation. Check that output is obtained by tuning. If output is not obtained, check the oscillator coil L101, the variable condenser, the antenna coil L502 and the condenser near them.

NOTE: Transmit an audio signal as weakly as possible. Check the emitter voltage Q102 after switching the input signal off.

C) Defective operation at FM stage
   1) Check the emitter voltages (Q1, Q2, Q102, Q103, Q104) and the +B voltage.
   2) Check that hum or signal is obtained on the speakers of both channels by touching TP103 with the oscillator in low frequency or a finger. When no sound is obtained, the Stereo multiplex circuit section is defective. (at FM STEREO position) (See to the "D" section).
   3) Transmit an FM modulated 10.7 MHz signal with a test oscillator to the base of Q104, Q103, Q102, the emitter (Q2) and the antenna coil (L1-a, L1-b, L1-c) through the capacitor of 0.01 MF respectively. Then check at which stage sound is not produced. Check the coils and condensers on the side of the collector or base at the defective stage.
   4) Transmit an FM modulated 98 MHz signal with a test oscillator to FM antenna. Then check the operations of Q1 and Q2. When the operations are defective, check the coils, the condenser and the variable condenser.

NOTE: Check the source voltage of Q1 after switching the antenna input off lest the voltage on the cut-off bias by AGC should be read.

D) Defective operation in stereo multiplex section
   1) Check the operating voltage respectively As for the votage value, refer to the schematic diagram.
   2) Check that hum or signal is obtained on the speakers of both channels by touching output pin with a finger or transmitting the audio signal generation to the pin. When no sound is obtained, check the sitches.
   3) Check from TP202 in the same way as 2. When no sound is obtained, check T203 or D204, D205, D206.
   4) Check from K103 in the same way as 2. When no sound is obtained, check Q201, Q203.

5) Push the Function Switch to FM and MODE switch to STEREO and transmit a 19 kHz, 50 mV signal to TP103. Then check that the stereo indicator lamp (P510) is lighted. When the indicator lamp is not lighted, connect the oscilloscope to the cathode of D201, TP201 and check a 38 kHz signal at the cathode of D203, TP202, and check D203, D204, D205, D206, T201, T202. The stereo indicator lamp can be checked with a tester. Note that this lamp is for 6V, 40 mA only.

CAUTIONS IN TROUBLESHOOTING

1. The terminals of the speaker may be loosened. But be sure to guard against short-circuit. After long use in short-circuit state the transistor at the output stage may become defective.
2. Pick up the leads of the transistors with a pincette and replace them quickly.
3. When replacing the transistors at the power stage, be sure to clean away the dust on the radiation board and the insulation board. Then apply silicone grease on each part. Be sure not to bend the root of the leg of the transistor. Bending the root of the leg may cause the wire inside the transistor to snap. After replacing, check that each leg does the transistor to snap. After replacing, check that each leg does not make contact with the radiation board.
4. As the transistors of the same name have the respective grade, use the transistor shown in the schematic diagram.
5. As the main amplifier section consists of the direct connected circuit, switch off when replacing the transistor.
6. Matched pairs of transistors and diodes are arranged as follows:

D105, D106 } 1N60 Ⓟ

{Q405 (2SC1213B)
{Q407 (2SA673B)

{Q406 (2SC1213B)
{Q408 (2SA673B)

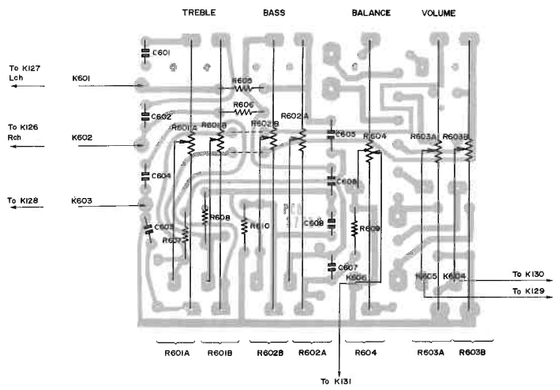


Figure 14 CONTROL VOLUME BOARD WIRING SIDE

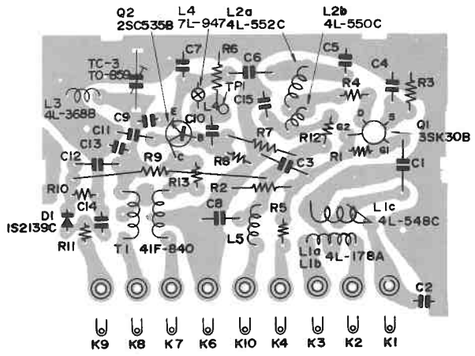


Figure 15 TUNER BOARD WIRING SIDE

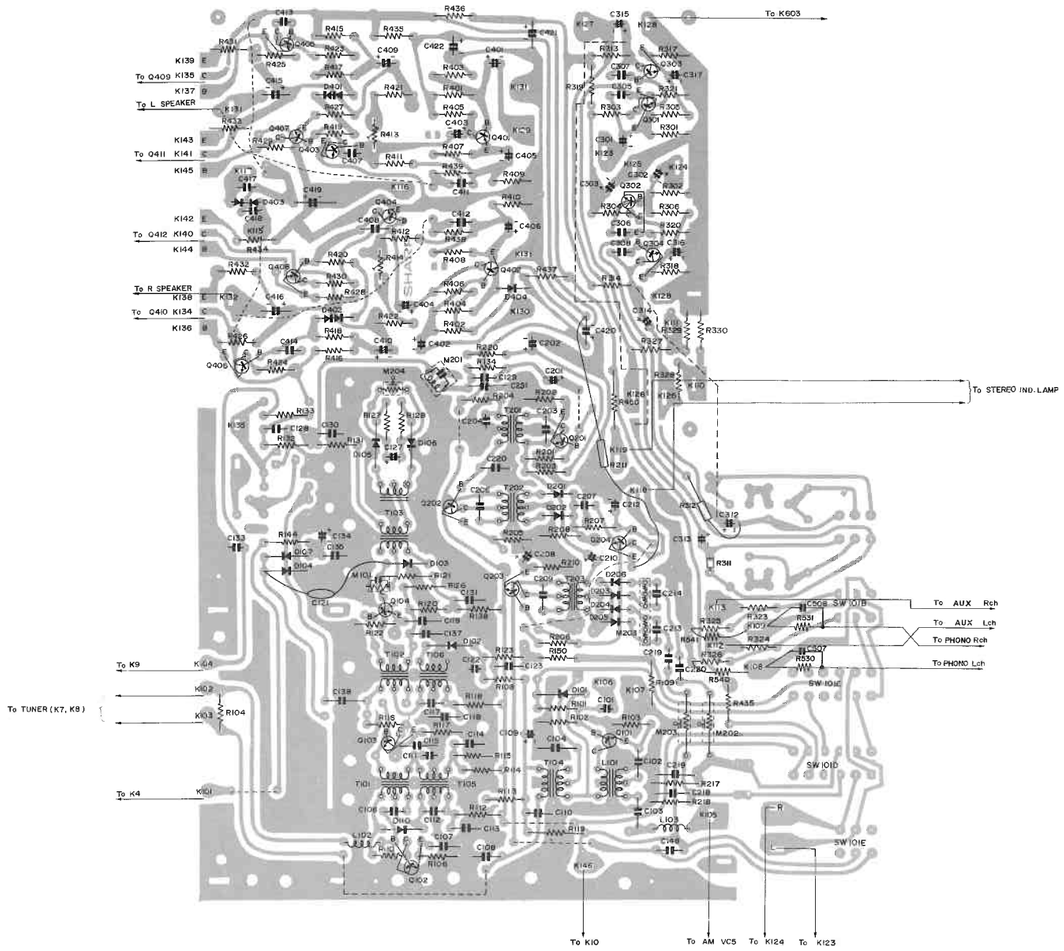


Figure 16 AUDIO BOARD WIRING SIDE

PARTS LIST

CAPACITOR

REF. NO.	PART NO.	DESCRIPTION
C1	D-5-157K	150PF, 50V, ±10%, Discap
C2,C5 C12	D-5-108F	10PF, 50V, ±1%, Discap
C3,C4 C8,C14 C15	D-5-205Z	.02MFD, 50V, +80%, −20%, Discap
C6	D-5-509C	5PF, 50V, ±0.25PF, Discap
C7	D-5-478K	47PF, 50V, ±10%, Discap
C9	D-5-309C	3PF, 50V, ±0.25PF, Discap
C10	D-5-337K	330PF, 50V, ±10%, Discap
C11	D-5-105P	.01MFD, 50V, +100%,−0%, Discap
C13	DCJ-5-108K	10PF, 50V, ±10%, Discap
C101,C108 C204	D-5-105P	.01MFD, 50V, +100%, −0%, Discap
C102	ML-5-105M	.01MFD, 50V, ±20%, Mylar
C103	D-5-337K	330PF, 50V, ±10%, Discap
C104,C105 C114,C115 C118,C119 C131,C132 C135,C137	D-5-405Z	.04MFD, 50V, +80%, −20%, Discap
C106	D-5-159C	1.5PF, 50V, ±0.25PF, Discap
C111,C133	D-5-205Z	.02MFD, 50V, +80%, −20%, Discap
C112,C117 C209	S-5-156J	1500PF, 50V, ±5%, Styrene
C121	D-5-228K	22PF, 50V, ±10%, Discap
C122	ML-5-105M	.01MFD, 50V, ±20%, Mylar
C123	ML-5-225M	.022MFD, 50V, ±20%, Mylar
C127,C208 C210	CU-1.6-102Q	10MFD, 16V, +100%,−10%, Electrolytic
C128	D-1.2-154M	0.15MFD, 12V, ±20%, Discap
C129	D-5-827K	820PF, 50V, ±10%, Discap
C130	D-5-157K	150PF, 50V, ±10%, Discap
C134,C147 C212,C301 C302	CU-5-103R	1MFD, 50V, +150%,−10%, Electrolytic
C207	D-5-338K	33PF, 50V, ±10%, Discap
C148	D-1.2-224M	0.22MFD, 12V, ±20%, Discap
C201	CU-1-332Q	33MFD, 10V, +100%,−10%, Electrolytic
C202	CU-1-101Q	100MFD, 10V, +100%,−10%, Electrolytic
C203,C206	S-5-336J	3300PF, 50V, ±5%, Styrene
C213,C214	D-5-107K	100PF, 50V, ±10%, Discap
C217,C218	ML-5-156M	1500PF, 50V, ±20%, Mylar
C219,C220	D-2.5-225K	.022MFD, 25V, ±10%, Discap
C220	D-5-477K	470PF, 50V, ±10%, Discap
C251	D-5-567K	560PF, 50V, ±10%, Discap
C303	CU-2.5-472Q	47MFD, 25V, +100%,−10%, Electrolytic
C305,C306 C307,C308	D-5-157K	150PF, 50V, ±10%, Discap
C309,C310	ML-5-686J	6800PF, 50V, ±5%, Mylar
C311,C312	ML-5-186J	1800PF, 50V, ±5%, Mylar
C313,C314	CU-2.5-473R	4.7MFD, 25V, +150%,−10%, Electrolytic
C315,C316	CU-2.5-102Q	10MFD, 25V, +100%,−10%, Electrolytic
C317,C318	CU-06-472Q	47MFD, 6V, +100%,−10%, Electrolytic
C401,C402	AD-1.6-104M	.1MFD, 16V, ±20%, Electrolytic
C403,C404	CU-1.6-102Q	10MFD, 16V, +100%,−10%, Electrolytic
C405,C406	CU-06-472Q	47MFD, 6V, +100%,−10%, Electrolytic
C407,C408	D-5-157K	150PF, 50V, ±10%, Discap
C409,C410 C422	CU-1.6-101Q	100MFD, 16V, +100%,−10%,Electrolytic
C411,C412 C413,C414	D-5-477K	470PF, 50V, ±10%, Discap
C415,C416	CU-2.5-471Q	470MFD, 25V, +100%,−10%, Electrolytic
C417,C418	CU5-405Z	.04MFD, 50V, +80%,−20%, Discap
C419	CU-3.5-100Q	1000MFD, 35V, +100%,−10%, Electrolytic
C420	CU-1.6-100Q	1000MFD, 16V, +100%,−10%, Electrolytic
C421	CU-2.5-100Q	1000MFD, 25V, +100%,−10%, Electrolytic
C501,C502	D-105P-UL	.01MFD, +100%,−0%, UL Spec
C503	D-5-158K	15PF, 50V, ±10%, Discap
C505,C506	NP-3-333M	3.3MFD, 30V, ±20%, Electrolytic
C510	D-1.5-208K	20PF, 15V, ±10%, Discap
C601,C602	ML-5-686K	6800PF, 50V, ±10%, Mylar
C603,C604	D-2.5-225K	.022MFD, 25V, ±10%, Discap
C605,C606	D-2.5-825K	.082MFD, 25V, ±10%, Discap
C607,C608	D-1.2-224M	.22MFD, 12V, ±20%, Discap
TC3	TO-859	Trimmer
TC1,2,4,5 VC1−5	XVC-179	Variable Tuning Gang

RESISTOR

(All resistors without specification are 1/4W, ±10%, Carbon type.)

REF. NO.	PART NO.	DESCRIPTION
R1	1/4M-100K	100K ohm
R2,R9	1/4M-1MK	1Meg ohm
R3	1/4M-39J	39 ohm, 1/4W, ±5%, Carbon
R4	1/4M-33K	33 ohm
R5	1/4M-15KK	15K ohm
R6	1/4M-2.7KK	2.7K ohm
R7	1/4M-12KK	12K ohm
R8	1/4M-6.8KK	6.8K ohm
R10	1/4M-820KK	820K ohm
R11	1/4M-220KK	220K ohm
R12	1/4M-270K	270 ohm
R13	1/4M-100K	100 ohm
R101	1/4M-56KK	56K ohm
R102,R126	1/4M-18KK	18K ohm
R103	1/4M-2.2KK	2.2K ohm
R104	1/4M-47K	47 ohm
R106,R205	1/4M-330K	330 ohm
R131,R138	1/4M-100K	100 ohm
R108	1/4M-39KK	39K ohm
R109	1/4M-150KK	150K ohm
R110,R112 R117,R118 R122,R202	1/4M-470K	470 ohm
R114,R135	1/4M-47KK	47K ohm
R115	1/4M-12KK	12K ohm
R116	1/4M-180K	180 ohm
R119,R139	1/4M-120KK	120K ohm
R120	1/4M-33KK	33K ohm
R121	1/4M-820K	820 ohm
R123	1/4M-1.2KK	1.2K ohm
R127,R128	1/4M-1KJ	1K ohm, 1/4W, ±5%, Carbon
R132	1/4M-220KK	220K ohm
R133,R201	1/4M-270KK	270K ohm
R134,R208	1/4M-22KK	22K ohm
R138,R206	1/4M-10KK	10K ohm
R144,R218 R219	1/4M-100KK	100K ohm
R203	1/4M-3.9KK	3.9K ohm

REF. NO.	PART NO.	DESCRIPTION
R204	1/4M-820KK	820K ohm
R206	1/4M-18KK	18K ohm
R207	1/4M-4.7KK	4.7K ohm
R210	1/4M-1KK	1K ohm
R211	1/4M-15K	15 ohm
R220	1/4M-3.3KK	3.3K ohm
R301,R302	1/4M-150KK	150K ohm
R303,R304 R305,R306	1/4M-220KK	220K ohm
R307,R308	1/4M-560KJ	560K ohm, 1/4W, ±5%, Carbon
R309,R310	1/4M-39KJ	39K ohm, 1/4W, ±5%, Carbon
R311,R312	1/4M-10KK	10K ohm
R313,R314	1/4M-4.7KK	4.7K ohm
R317,R318 R320,R321	1/4M-820K	820 ohm
R319	1/4M-6.8KK	6.8K ohm
R323,R324 R329,R330	1/4M-100KK	100K ohm
R325,R326	1/4M-22KK	22K ohm
R401,R402	1/4M-150KK	150K ohm
R403,R404	1/4M-100KK	100K ohm
R405,R406 R417,R418 R438,R439 R435	1/4M-2.2KK	2.2K ohm
R407,R408	1/4M-470K	470 ohm
R409,R410	1/4M-10J	10 ohm, 1/4W, ±5%, Carbon
R413,R414	8V-3490	Semi-Variable Resistor
R415,R416	1/4M-330K	330 ohm
R419,R420	1/4M-120K	120 ohm
R421,R422	1/4M-220KK	220K ohm
R423,R424 R427,R428	1/4M-22K	22 ohm
R425,R426 R429,R430	1/4M-100K	100 ohm
R431,R432 R433,R434	1/2LL-0.47K	0.47 ohm, 1/2W, ±10%, Resin
R437	1/4M-1.2KK	1.2K ohm
R436	1/4M-1.5KK	1.5K ohm
R450	2PO-560K	560 ohm, 2W, ±10%, Oxide Film
R503,R504	1/2M-220K	220 ohm, 1/2W, ±10%, Carbon
R505,R506 R513,R514 R517	1/4M-100KK	100K ohm
R507,R508	1/4SA-10KK	10K ohm
R515,R516	1/4SA-33KK	33K ohm
R518	1/2M-3.3MK	3.3 Meg ohm, 1/2W, ±10%, Carbon
R530,R531	1/4M-1MK	150K ohm
R540,R541	1/4M-150KK	1 Meg ohm
R602 (AB)	X8V-3494	50K ohm, Bass & Treble Control
R603 (AB)	X8V-3492	250K ohm, Volume Control
R604	X8V-3496	50K ohm, Balance Control
R605,R606	1/4SA-2.2KK	2.2K ohm
R607,R608	1/4SA-3.9KK	3.9K ohm
R609,R610	1/4SA-560K	560 ohm

SEMICONDUCTORS

REF. NO.	PART NO.	DESCRIPTION
Q1	3SK-30B	Transistor, FM RF
Q2	2SC-535B	Transistor, FM OSC
Q101	2SC454B	Transistor, AM Converter
Q102,Q103	2SC460B	Transistor, AM/FM IF Amp.
Q104	2SC460C	Transistor, FM IF Amp
Q201,Q202	2SC-458B	Transistor, MPX 19kHz Amp
Q203	2SC-458C	Transistor, MPX 38kHz Amp
Q204	2SC-458C	Transistor, FM STEREO Indicator
Q301,Q302	2SC458LGC	Transistor, Pre-Amp
Q303,Q304	2SC458D	Transistor, Pre-Amp
Q401,Q402	2SC-458LGC	Transistor, Power, Pre-Amp
Q403,Q404	2SC-458C	Transistor, Power, Pre-Amp
Q405,Q406	2SC-1213B	Transistor, Power, Driver Amp
Q407,Q408	2SA-673B	Transistor, Power, Driver Amp
Q409,Q410 Q411,Q412	2SC1162CP	Transistor, Power
D1	1S2139C	Diode, AFC
D101	1N60	Diode, AM AGC
D102	1N60	Diode, AM Detector
D103,D110	1N60	Diode, FM Limiter
D104,D107	1N60	Diode, FM AGC
D105,D106	1N60P	Diode, FM Detector
D201,D202	1N-34A	Diode, MPX Pilot Signal
D203,D204 D205,D206	1N-34A	Diode, MPX Switching
D401,D402	HV-46GR	Diode, Temperature Compensation
D403	SI-RECT-59	Diode, Rectifier
D404	HZ-9	Diode, Zener

COILS AND TRANSFORMERS

REF. NO.	PART NO.	DESCRIPTION
L1-a,L1-b	4L-178A	Coil, FM Antenna
L1-c	4L-548C	Coil, FM Antenna
L2-a	4L-552C	Coil, FM RF
L2-b	4L-550C	Coil, FM RF
L3	4L-368B	Coil, FM OSC
L4	7L-947	Coil, 10.7MHz
L5	HL-100M	Coil
L101	7L-054B	Coil, AM OSC
L102	HL-108M	Coil
L103	HL-338M	Coil
L501	4L-138A	Coil, AM Antenna
L502	4L-922	Coil
L503,L504	4L-965	Coil, Line Filter
T1	4IF-840	Transformer, FM IF
T101	4IF-835	Transformer, FM IF
T102	4IF-780	Transformer, FM IF
T103	4IF-771	Transformer, FM Detector
T104	4IF-829	Transformer, AM IF
T105	4IF-782	Transformer, AM IF
T106	4IF-783	Transformer, AM Detector
T201	4L-992	Transformer, MPX 19kHz
T202	4L-994	Transformer, MPX 19kHz
T203	4L-996	Transformer, MPX 38kHz
T501	5T-692UL	Transformer, Power

PACKAGED CIRCUIT

REF. NO.	PART NO.	DESCRIPTION
M101	PRC-315	Capristor
M201	4L-018	Capristor, SCA Filter
M202,M203	PRC-413	Capristor, 38kHz Filter
M204	PRC-405	Capristor, FM Detector
M205	PRC-409	Capristor, MPX Switching

REF. NO.	PART NO.	DESCRIPTION
SOCKETS, SWITCHES, JACKS & PILOT LAMPS		
	SO-219	Socket, Pilot Lamp
	SO-043	Socket, AC Outlet
SO503	SO-923	Socket, Speaker
SO504	SO-989	Socket, Input Source
SO506	XT-239	Terminal, FM ANT
	J-995	Jack, Headphone
SW101	6S-99	Switch, Push Button
SW501	X13S-006UL	Switch, Power UL Spec
PL505	PL-585	Pilot Lamp, FM STEREO Indication
PL501	PL-567	Pilot Lamp, Dial Illumination
PL502		
PL503		
PL504		
PL506	SISIN-3775	Pilot Lamp with Dial pointer
MISCELLANEOUS		
	GOMULEG486	Leg. Rubber
	XSOK-C3775	Plate, Bottom
	8K-392	Knob, Tuning
	8K-438	Knob, Power
	8K-476	Push Button, PHONO
	8K-478	Push Button, AUX/TAPE
	8K-480	Push Button, AM
	8K-482	Push Button, FM
	8K-484	Push Button, MONO/STEREO
	8K-486	Knob, VOLUME, BALANCE, BASS, TREBLE
	D-COV-3825	Dust Cover
	UBUTA3951	Plate, Back
	KC-151	Spacer, Felt, Knob
	SHEET-456	Felt, Power Switch
	SSHEET3775	Sheet, Pointer
	IND-P3775	Plate, SHARP
	SHEET-189	Felt, Slide Volume
	ACRYL-3825	Smoked Panel
	SPACER911B	Spacer
	P-SHAFT	Shaft, Pulley
	P-506	Pulley
	SPRING	Spring
	DIAL-3825	Panel, Dial
	PG-427	Plug
	ANGLE-3775	Bracket, Retainer
	DIAL-SPAC	Spacer, Dial
	ZET-P3379	Insulator, Headphone
	P-A-3775B	Bracket, Pulley
	DS-518	Shaft, Flywheel
	RAIL-3775	Rail, Pointer
	SPAC-4062D	Spacer, Headphone
	PCB-3775B	Printed Circuit Board, Tone
	XSYOMEICOV	Cover, Illumination
	XP-A-3775A	Bracket, Pulley A
	XP-A-3775C	Bracket, Pulley C
	XVA-628	Bracket, Control
	ACC-283CU	AC Cord
	CH-96	Holder, Core
	SNAP-BUSH	Bush, AC Cord
	HON-P-3775	Heat Sink
	YZ-28S	Washer, Transistor

REF. NO.	PART NO.	DESCRIPTION
	SK-18A	Spacer, Transistor
	PCB-3775A	Printed Circuit Board, Main
	X2MC-3775	Chassis, Bottom
	XSUB-A775A	Bracket, Strengthen A
	XSUB-A775B	Bracket, Strengthen B
	PCB-3693A	Printed Circuit Board, Tuner
	SHIELD-COV	Case, Shield
	COIL STOPER	Holder, Coil
	XDP-414	Drum
	XFLY-325	Flywheel
	U-BUT3775B	Panel, Speaker, Rear
	18P-45A	Speaker, Woofer
	5TW-298	Speaker, Tweeter
	OP-CORD029	Cord, Speaker
	X2CAB-3825A	Cabinet
	BAFFU-3775	Plate, Speaker
	DEC-P-3775	Plate, Decoration
	IND-B-3693	Badge, Speaker
	N-291	Net, Speaker
	PANEL-3775	Panel Control
	PANL-S3775	Spacer, Push button
	CRMP-A723A	Cover, Hole of changer fixing
	XCRAMA723B	Cover, Hole of changer fixing
	PL-DEC-COV	Cover, Pilot Lamp
	S-COV3825	Plate, Shield
	TIP-317	Tip, Power For Changer
	PG-421	Plug, Power For Changer
	XT-ANG3815	Bracket, Terminal
	CON-W3815L	Cord, Changer Output (LEFT)
	CON-W3815R	Cord, Changer Output (RIGHT)
	SPACER179C	Spacer, Headphone
	VCA-3775	Bracket, Variable Capacitor
	DEC-P-3775	Decoration Plate, Speaker

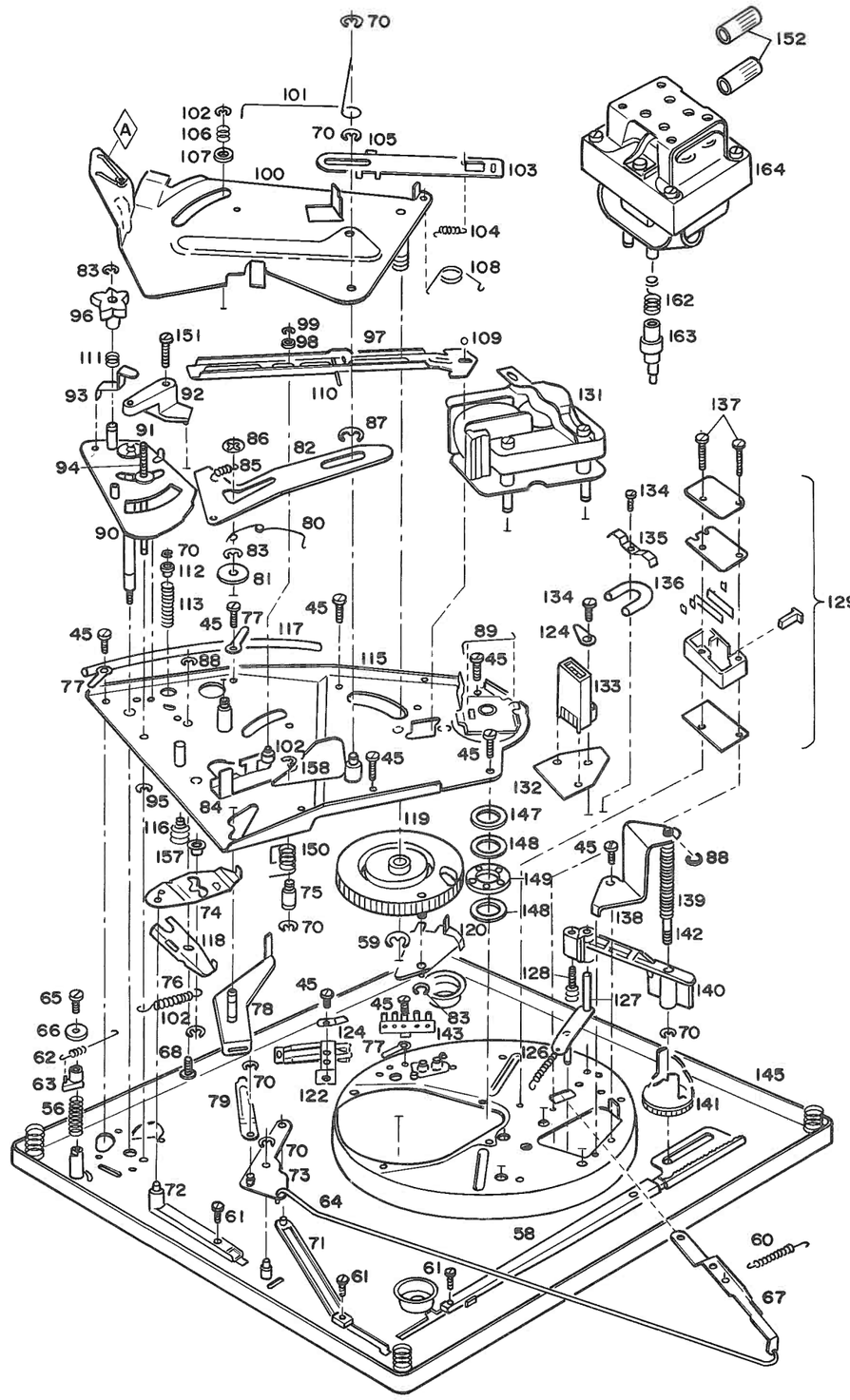


Figure 17

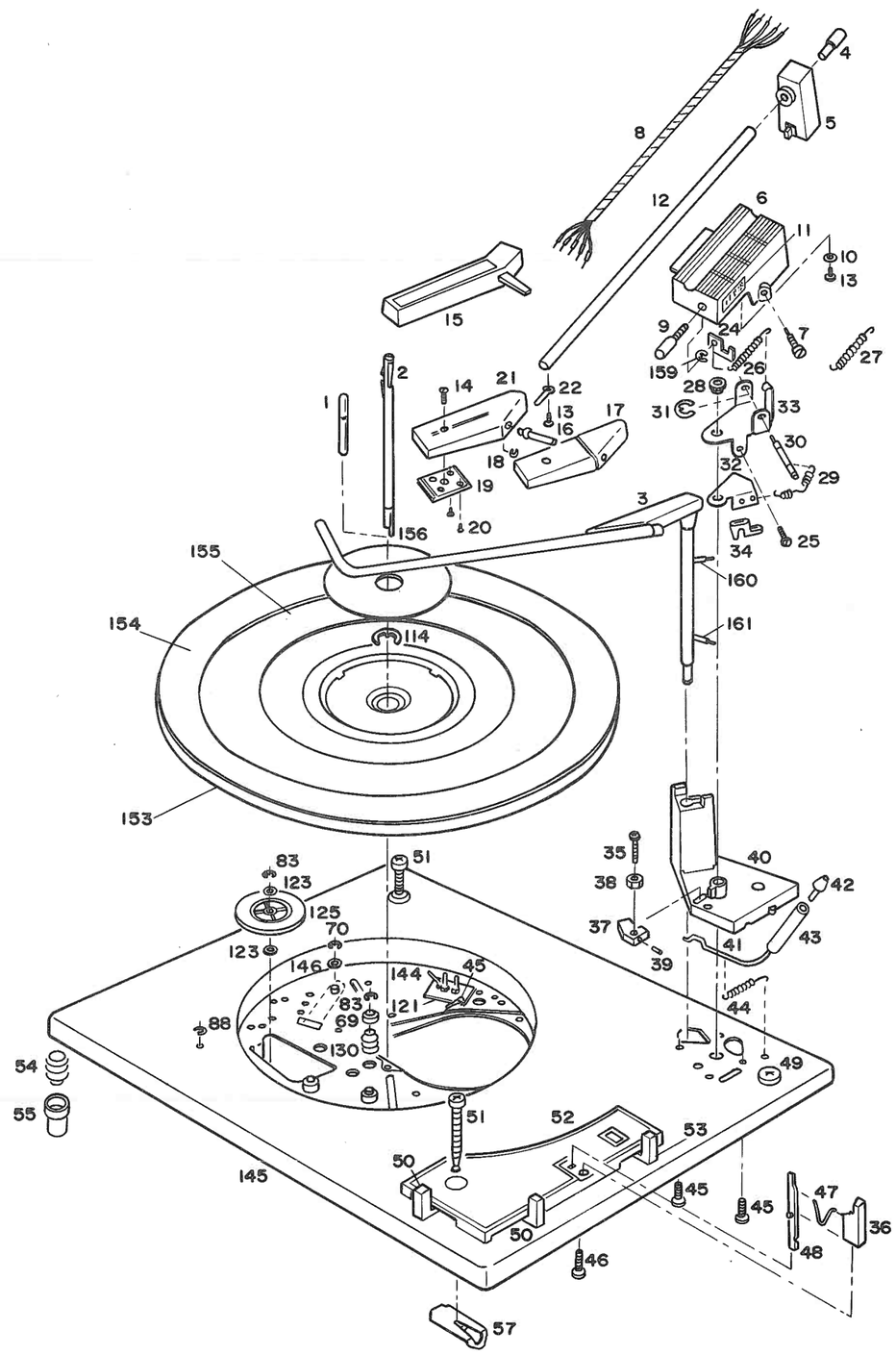


Figure 18

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1.	A108748	Stub Spindle.
2.	A107043	Centre Spindle Assembly.
3.	B108086	Control Arm Assembly.
4.	A108399	Tube End
5.	B107003	Counterweight.
6.	A109319	P.U. Body Sub Assembly.
7.	A106652	P.U. Pivot Screw.
8.	A106745	23" Quin. P.U. Lead.
9.	A108344	Balance Adjusting Screw.
10.	A106504	6B.A. Lockwasher.
11.	A108346	Stylus Pressure Label.
12.	B106660	Pick Up Tube.
13.	A109551	Screw Type A, No. 4 x ¼" Rec. Pan. Hd.
14.	A106573	Screw 6B.A. x 3/16" Rec. C'Sunk Hd.
15.	SC7M-2ST16	Stereo Cartridge Assy. w/sap. stylus (opt.)
	SC7M-2ST17	Stereo Cartridge Assy. w/dia./sap. stylus (opt.)
16.	A104964	Finger Lift.
17.	B107351	Pick Up Head.
18.	A102128	Circlip.
19.	A106775	Adaptor Plate.
20.	A106506	Screw Type Z, No.2 x 1/8" Sltd. Pan Hd.
21.	B106776	Pick Up Head.
22.	A103587	Solder Tag.
23.	PS899	45 rpm Adaptor Spindle (optional).
24.	A108345	Balance Adjuster.
25.	A106917	Screw 6B.A. x 3/8" Sltd. Ch. Hd.
26.	A200510	P.U. Balance Spring. (Use with item 15)
27.	A105669	P.U. Balance Spring.
28.	A105624	P.U. Spindle Nut.
29.	A108382	Hinge Retainer Spring.
30.	A108381	Pick Up Pivot.
31.	A106205	Circlip.
32.	A106654	Pick Adjuster.
33.	A108384	Hinge Bracket Riv, Assembly.
34.	A106047	Locking Sleeve.
35.	A105712	Adjusting Screw.
36.	A106663	Pick Up Rest.
37.	A106665	Raising Pad.
38.	A105907	Nut.
39.	A106505	Grub Screw 6B.A. x 1/8"
40.	C106138	Control Housing.
41.	A106474	Raising Arm.
42.	A106472	Cap.
43.	A106471	Knob.
44.	A106473	Spring.
45.	A106510	Screw Type Z, No.6 x 1/4" Sltd. Pan Hd.
46.	A106507	Screw Type 25, 6-20 x 3/4" Sltd. Pan Hd.
47.	A106173	P.U. Rest Spring.
48.	A10664	Pick Up Clip.
49.	B106814	Anti-Skate Control.
50.	B106122	Knob.
51.	A104189	Transit Screw.
52.	C109315	Control Cover.
53.	A109317	Selector Knob.
54.	A106090	Unit Mounting Spring.
55.	A106089	Spring Cup.
56.	A106813	Anti-Skate Control Spring.
57.	A102166	Retaining Clip.
58.	B108113	Speed Change Slide Assembly.
59.	A102110	Circlip.
60.	A105826	Switch Lever Spring.
61.	A105267	Screw Type 25, 4-24 x 5/16" Sltd. Pan Hd.
62.	A106812	Anti-Skate Spring.
63.	B106815	Spring Anchor.
64.	B106405	Switch Link.
65.	A107863	Screw Type 25, 4-24 x 9/16" Sltd. Pan Hd.
66.	A106816	Washer.
67.	A106129	Switch Lever.
68.	A108064	Slide Pin.
69.	A101646	Washer.
70.	A102109	Circlip.
71.	B106119	Reject Slide.
72.	B106143	Selector Slide.
73.	A106193	Reject Plate Assembly.
74.	A108033	Detent Plate
75.	A108894	Selector Pivot.
76.	A108075	Detent Plate Spring.
77.	A102126	Solder Tag.
78.	A108283	Reject Lever Assembly.
79.	A106134	Reject Link.
80.	A106627	Detent Spring.
81.	A105660	Control Washer
82.	B105592	Cut-off Lever.
83.	A100762	Circlip.
84.	B108036	Selector Lever.
85.	A102623	Cut-off Lever Spring.
86;	A102251	Retainer.
87.	A101526	Circlip.
88.	A102128	Circlip.
89.	A104882	Retaining Clip.
90.	B108085	Quadrant Assembly.
91.	A107154	3/32" Dia. Ball Bearing.
92.	A106965	Support Bracket.
93.	A107004	Support Spring.
94.	A106697	P.U. Raising Spindle Assembly.
95.	A108334	Circlip.
96.	B108073	Toggle Wheel.
97.	B106962	Actuating Slide.
98.	A106966	Washer.
99.	A104077	Circlip.
100.	B108168	Operating Plate Assembly.
101.	A108078	Selector Drive Spring.
102.	A100785	Circlip.
103.	B105597	Feed Lever Link.

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
104.	A105827	Link Return Spring.
105.	A106968	Feed Lever Link Spring.
106.	A108077	Spring
107.	A103290	Washer.
108.	A106980	Operating Plate Spring
109.	A107419	9/64" Dia. Ball Bearing.
110.	A105901	Actuating Slide Spring.
111.	A108654	Spring Clip.
112.	A104861	Spacer.
113.	A105985	Control Sprindle Spring
114.	A105678	Circlip.
115.	C108104	Main Sub Plate Riv. Assembly.
116.	A108083	Cut-off Slide Spring.
117.	A108401	7" 3mm P.V.C. Sleeving.
118.	A108034	Cut-off Slide.
119.	A102133	Cam Gear Riveting Assembly.
120.	A106819	Actuating Pawl Assembly.
121.	A102616	Phono Socket.
122.	A107086	Muting Switch Assembly.
123.	A101620	J.P. Spindle Washer.
124.	A106749	4B.A. Tag Lockwasher.
125.	A101623	Jockey Pulley Assembly.
126.	A105824	Jockey Pulley Spring.
127.	A105965	Jockey Arm Riv. Assembly.
128.	A105619	Adjusting Screw.
129.	B108285	Switch Assembly.
	B108326	Switch Assembly w/pop filter.
130.	A102181	Rubber Mounting.
131.		Two Pole Motor Assembly. (See list below).
132.	A104865	Insulating Strip.
133.	A103096	AMP Plug Housing.
134.	A105623	Screw Type 25, 6-20 x 3/8" Sltd. Pan Hd.
135.	A102718	Cable Clamp.
136.	A106513	3" 5mm P.V.C. Sleeving
137.	A107418	Screw Type 25, 4-24 x 3/4" Sltd. Pan Hd.
138.	A106034	Speed Change Bracket.
139.	A105831	Raising Spindle Spring.
140.	B106021	Speed Change Arm.
141.	B106113	Raising Cam.
142.	A108589	Raising Spindle.
143.	A106206	Tag Mounting Strip.
144.	A102352	Solder Tag.
145.	B109328	Mainplate Sub Assembly.
146.	A102595	Washer.
147.	A102058	Damping Washer.
148.	A101506	Thrust Washer.
149.	A101649	Ball Race.
150.	A108891	Selector Pivot Spring
151.	A106512	Screw Type BT, 4-24 x 5/8" Rec. Pan Hd.
152.	A105472	Screw-on Connector.
153.	C106194	Turntable Assembly.
154.	C109261	Turntable Mat.
155.	B106139	Turntable Trim. (optional)
156.	B106024	T.T. Center Disc.
157.	A108461	Roller.
158.	A101620	Washer.
159.	A108348	Circlip.
160.	A107348	Control Pin.
161.	A108066	Cut-off Peg.
162.	A104765	Drive Spring
163.	A106719	50 CPS Pulley
	A106720	60 CPS Pulley.
164.		4-pole Motor Assembly (see Motor Chart).

TWO POLE MOTOR ASSEMBLY

Motor Type	Voltage	Frequency
TP8/150	120V	60C
TP8/152 (U/L Amplok)	120V	60C

FOUR POLE MOTOR ASSEMBLY

Motor Type	Voltage	Frequency
FP10/3 (U/L)	120	50/60
FP10/4 (U/L Amplok)	120	50/60

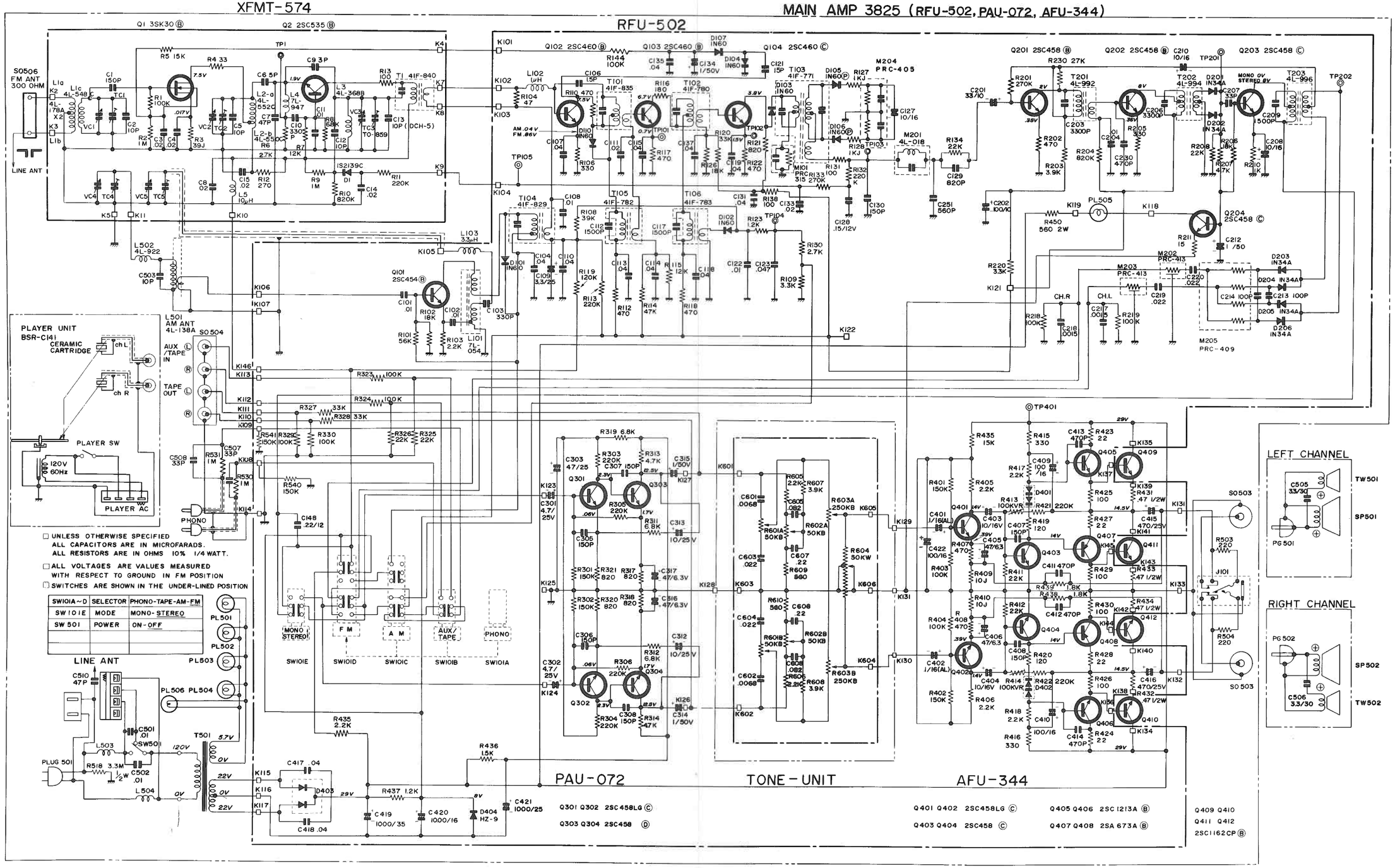
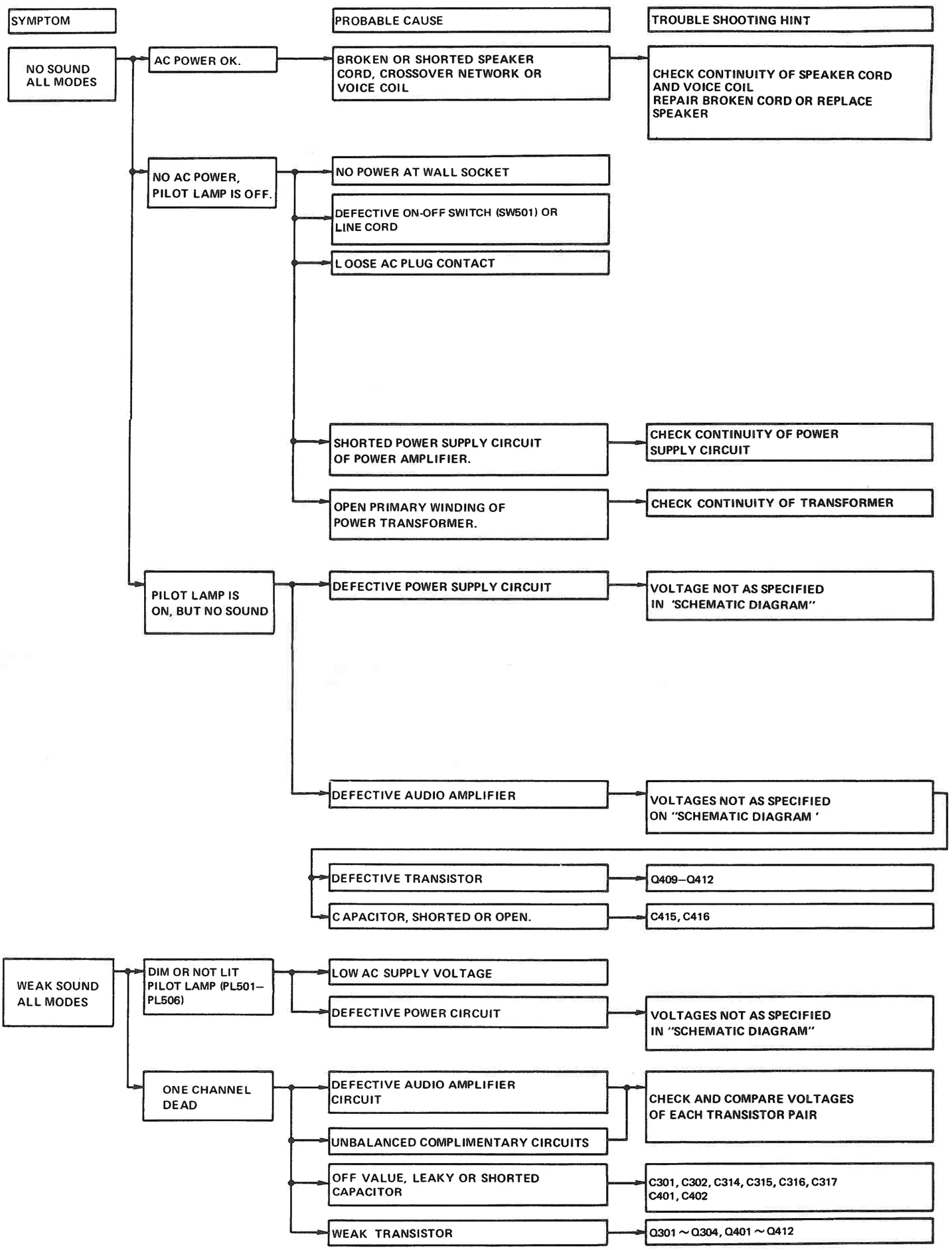
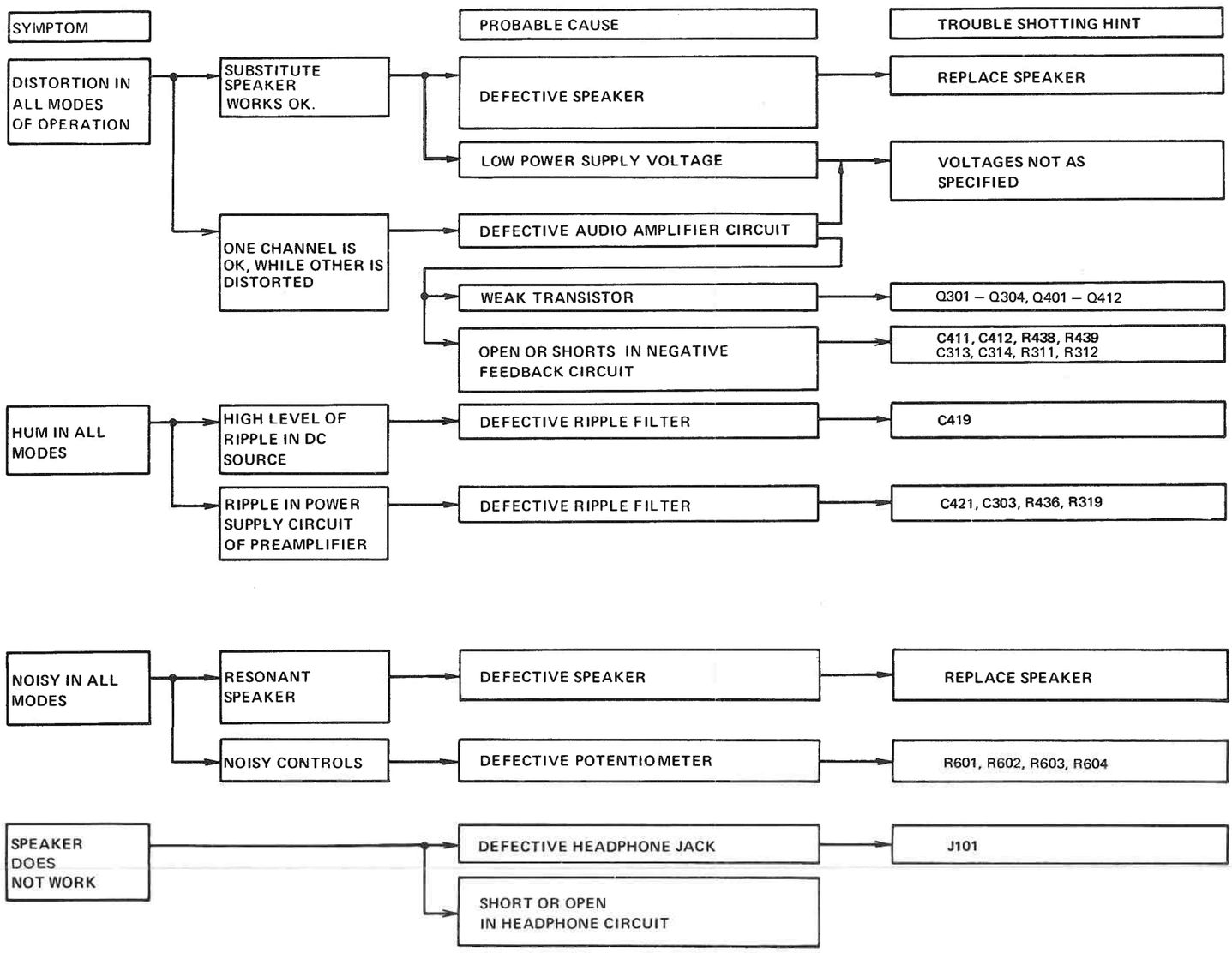


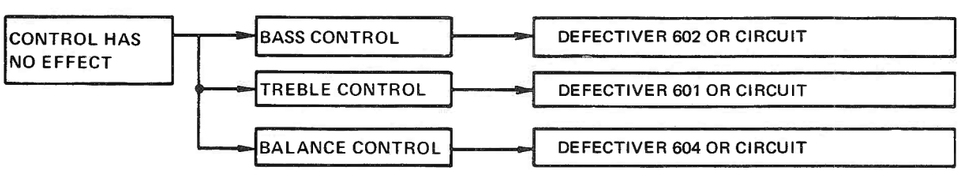
Figure 19 SCHEMATIC DIAGRAM

ALL OPERATIONAL MODES (1)

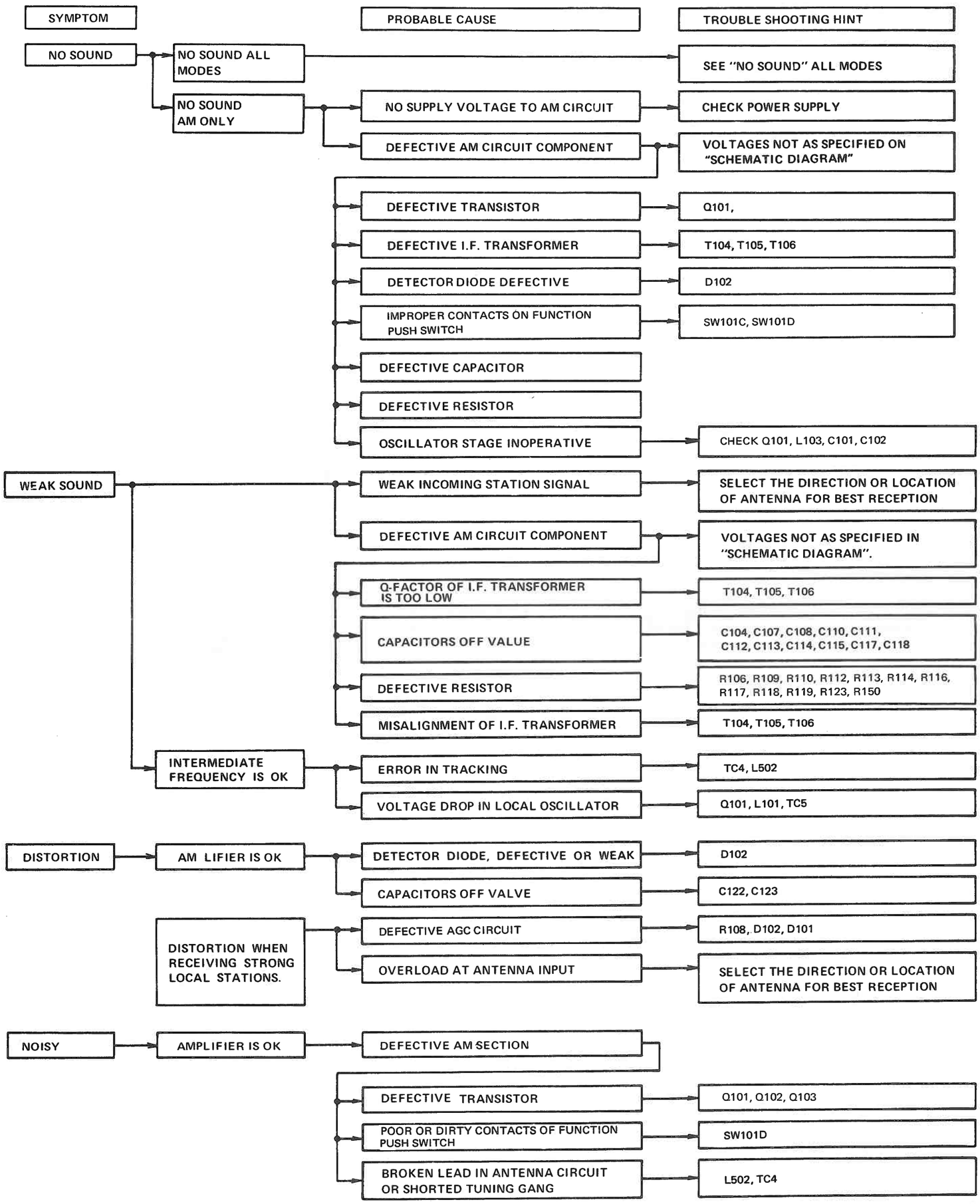

SYMPTOM
PROBABLE CAUSE
TROUBLE SHOOTING HINT
NO SOUND ALL MODES
AC POWER OK.
BROKEN OR SHORTED SPEAKER CORD, CROSSOVER NETWORK OR VOICE COIL
CHECK CONTINUITY OF SPEAKER CORD AND VOICE COIL
REPAIR BROKEN CORD OR REPLACE SPEAKER
NO AC POWER, PILOT LAMP IS OFF.
NO POWER AT WALL SOCKET
DEFECTIVE ON-OFF SWITCH (SW501) OR LINE CORD
LOOSE AC PLUG CONTACT
SHORTED POWER SUPPLY CIRCUIT OF POWER AMPLIFIER.
CHECK CONTINUITY OF POWER SUPPLY CIRCUIT
OPEN PRIMARY WINDING OF POWER TRANSFORMER.
CHECK CONTINUITY OF TRANSFORMER
PILOT LAMP IS ON, BUT NO SOUND
DEFECTIVE POWER SUPPLY CIRCUIT
VOLTAGE NOT AS SPECIFIED IN 'SCHEMATIC DIAGRAM"
DEFECTIVE AUDIO AMPLIFIER
VOLTAGES NOT AS SPECIFIED ON "SCHEMATIC DIAGRAM '
DEFECTIVE TRANSISTOR
Q409–Q412
CAPACITOR, SHORTED OR OPEN.
C415, C416
WEAK SOUND ALL MODES
DIM OR NOT LIT PILOT LAMP (PL501–PL506)
LOW AC SUPPLY VOLTAGE
DEFECTIVE POWER CIRCUIT
VOLTAGES NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
ONE CHANNEL DEAD
DEFECTIVE AUDIO AMPLIFIER CIRCUIT
CHECK AND COMPARE VOLTAGES OF EACH TRANSISTOR PAIR
UNBALANCED COMPLIMENTARY CIRCUITS
OFF VALUE, LEAKY OR SHORTED CAPACITOR
C301, C302, C314, C315, C316, C317 C401, C402
WEAK TRANSISTOR
Q301 ~ Q304, Q401 ~ Q412

ALL OPERATIONAL MODES (2)

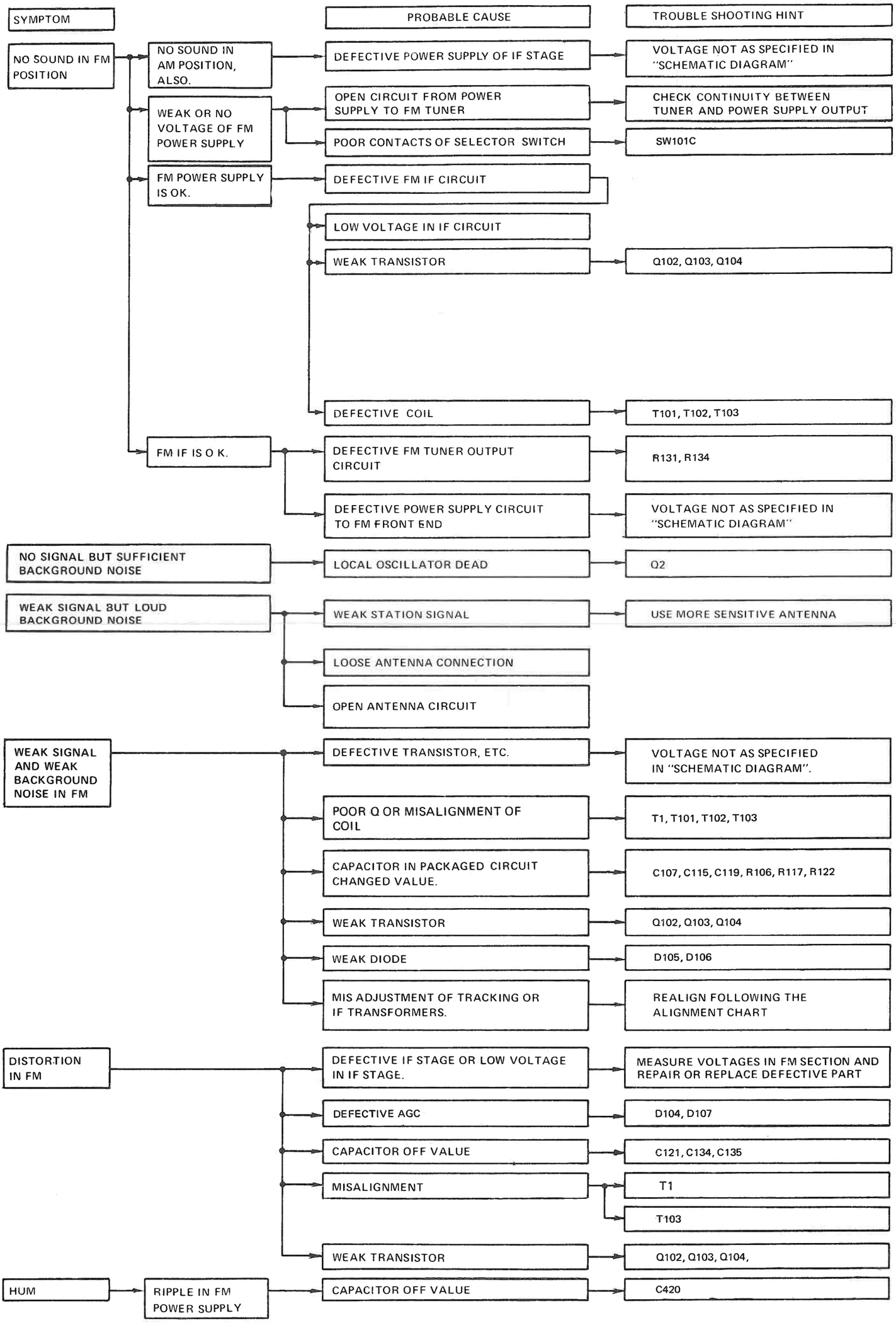




AM RECEPTION



FM RECEPTION


SYMPTOM
PROBABLE CAUSE
TROUBLE SHOOTING HINT
NO SOUND IN FM POSITION
NO SOUND IN AM POSITION, ALSO.
DEFECTIVE POWER SUPPLY OF IF STAGE
VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
WEAK OR NO VOLTAGE OF FM POWER SUPPLY
OPEN CIRCUIT FROM POWER SUPPLY TO FM TUNER
CHECK CONTINUITY BETWEEN TUNER AND POWER SUPPLY OUTPUT
POOR CONTACTS OF SELECTOR SWITCH
SW101C
FM POWER SUPPLY IS OK.
DEFECTIVE FM IF CIRCUIT
LOW VOLTAGE IN IF CIRCUIT
WEAK TRANSISTOR
Q102, Q103, Q104
DEFECTIVE COIL
T101, T102, T103
FM IF IS O K.
DEFECTIVE FM TUNER OUTPUT CIRCUIT
R131, R134
DEFECTIVE POWER SUPPLY CIRCUIT TO FM FRONT END
VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
NO SIGNAL BUT SUFFICIENT BACKGROUND NOISE
LOCAL OSCILLATOR DEAD
Q2
WEAK SIGNAL BUT LOUD BACKGROUND NOISE
WEAK STATION SIGNAL
USE MORE SENSITIVE ANTENNA
LOOSE ANTENNA CONNECTION
OPEN ANTENNA CIRCUIT
WEAK SIGNAL AND WEAK BACKGROUND NOISE IN FM
DEFECTIVE TRANSISTOR, ETC.
VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM".
POOR Q OR MISALIGNMENT OF COIL
T1, T101, T102, T103
CAPACITOR IN PACKAGED CIRCUIT CHANGED VALUE.
C107, C115, C119, R106, R117, R122
WEAK TRANSISTOR
Q102, Q103, Q104
WEAK DIODE
D105, D106
MIS ADJUSTMENT OF TRACKING OR IF TRANSFORMERS.
REALIGN FOLLOWING THE ALIGNMENT CHART
DISTORTION IN FM
DEFECTIVE IF STAGE OR LOW VOLTAGE IN IF STAGE.
MEASURE VOLTAGES IN FM SECTION AND REPAIR OR REPLACE DEFECTIVE PART
DEFECTIVE AGC
D104, D107
CAPACITOR OFF VALUE
C121, C134, C135
MISALIGNMENT
T1
T103
WEAK TRANSISTOR
Q102, Q103, Q104,
HUM
RIPPLE IN FM POWER SUPPLY
CAPACITOR OFF VALUE
C420

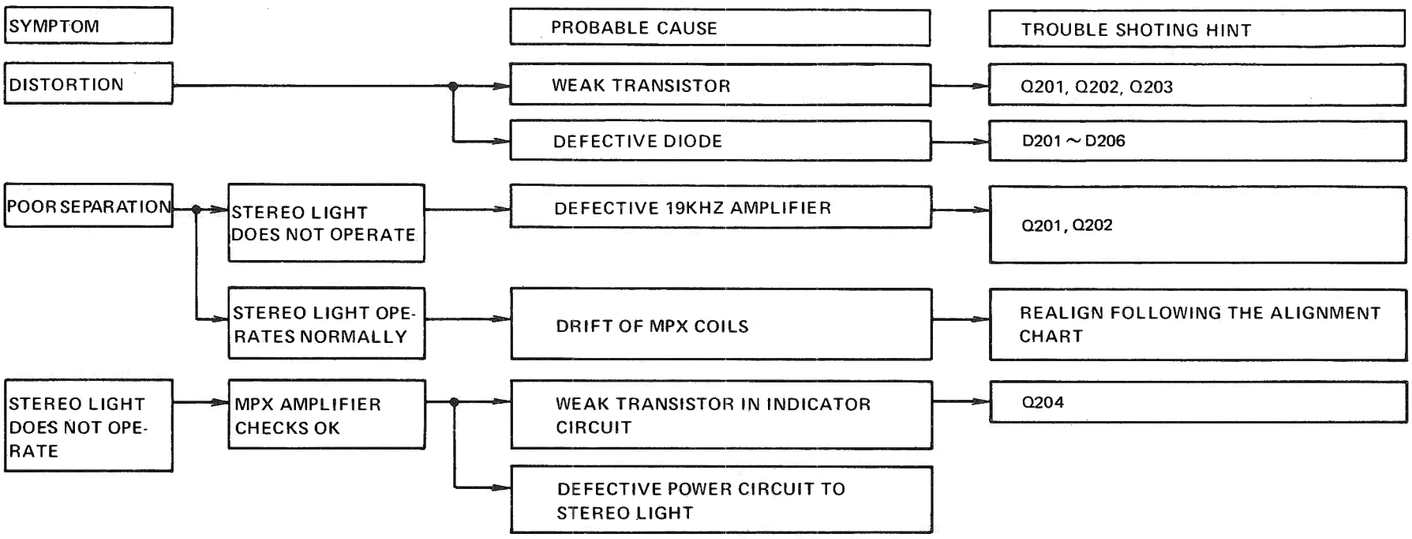
FM RECEPTION (2)

SYMPTOM	PROBABLE CAUSE	TROUBLE SHOOTING HINT
NOISY	NOISY ALL MODES OF OPERATION	SEE "NOISY" IN CHART FOR "ALL MODES"
	DEFECTIVE FM IF STAGE OR FM TUNER	VOLTAGE NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM".
	WEAK TRANSISTOR	Q1, Q2, Q102~Q104
	CLICKING NOISES	CONTACTS ON SELECTOR SWITCH DIRTY OR INTERMITTENT — SW101E
	NOISY WITH STRONG SIGNAL ONLY	DEFECTIVE AGC CIRCUIT — D104, D107, C121, C134, C135
		TOO STRONG SIGNAL — CHANGE ANTENNA OR USE ONLY A VERY SHORT LEAD WIRE
DIAL CALIBRATION OFF	POINTER DOES NOT MOVE SMOOTHLY	POINTER OFF OF TRACK OR HITS OBSTRUCTION
	POINTER RUNS OVER DIAL SCALE.	POINTER DOES NOT START AT ZERO POINT OF DIAL — MECHANICALLY RESET POINTER AT ZERO
		RF TRACKING OFF. — REALIGN USING ALIGNMENT CHART FOR TRACKING.

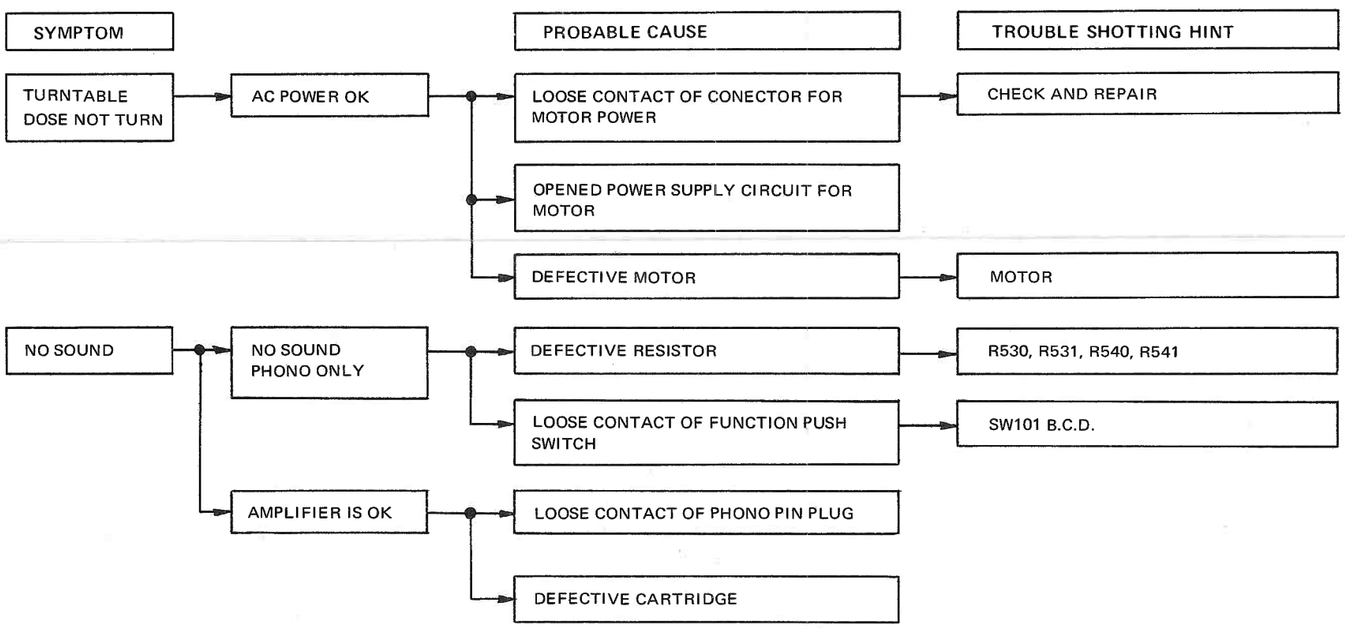
FM MPX RECEPTION

SYMPTOM		PROBABLE CAUSE	TROUBLE SHOOTING HINT
NO SOUND IN FM STEREO POSITION	NORMAL IN FM MONO POSITION	DEFECTIVE MODE PUSH SWITCH	SW101E
	NO SOUND IN FM MONO POSITION	DEFECTIVE FM TUNER	SEE "TROUBLE SHOOTING OF FM RECEPTION"
		DEFECTIVE FM MPX SECTION	
		DEFECTIVE COMPOSITE SIGNAL AMPLIFIER STAGE	Q201, C201, R201, R203
	NO SOUND ON ONE CHANNEL	DEFECTIVE MPX OUTPUT CIRCUIT	M202, M203, C219, C220
NO STEREO SEPARATION	STEREO LIGHT OPERATES NORMALLY	COMPONENTS IN ONE CHANNEL PHYSICALLY TOUCHING PARTS FOR OTHER CHANNEL IN PREAMP, AUDIO AMPLIFIER OR MPX CIRCUIT	
	STEREO LIGHT DOES NOT LIGHT WHEN RECEIVING STEREO SIGNAL	38KHz AMPLIFIER CIRCUIT DEFECTIVE	VOLTAGES NOT AS SPECIFIED IN "SCHEMATIC DIAGRAM"
		WEAK TRANSISTOR	Q201, Q202, Q203, Q204
		WEAK DIODE	D201 ~ D206
		DEFECTIVE MPX COIL	T201 ~ T203
		DEFECTIVE CAPACITOR	C201, C204, C206

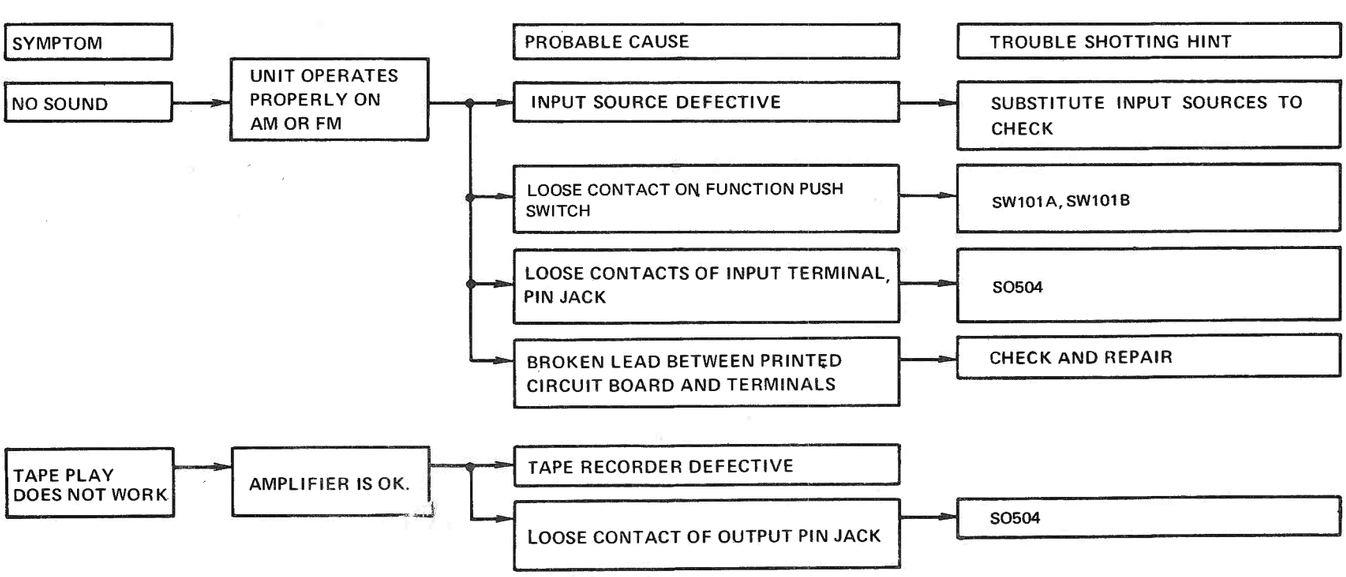
FM MPX RECEPTION (2)



PHONO PLAYING



USING WITH EXTERNAL INPUTS OR OUTPUTS (PHONO TAPE, ETC.)



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